US009239722B1

(12) **United States Patent**
Calahan et al.

(10) **Patent No.: US 9,239,722 B1**
(45) **Date of Patent: Jan. 19, 2016**

(54) **SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR INTERACTING WITH A PROCESS DIAGRAM**

(75) Inventors: **Patrick Calahan**, San Francisco, CA (US); **Shilpa Goel**, Mountain View, CA (US); **Varadarajan Rajaram**, San Francisco, CA (US); **David Park**, San Francisco, CA (US); **Miguel Canizares**, San Francisco, CA (US); **Venkadeshkumar Dhandapani**, San Francisco, CA (US)

(73) Assignee: **salesforce.com, inc.**, San Francisco, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 344 days.

(21) Appl. No.: **12/751,906**

(22) Filed: **Mar. 31, 2010**

(51) **Int. Cl.**
G06F 3/048 (2013.01)
G06F 9/44 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 9/44*** (2013.01)

(58) **Field of Classification Search**
USPC 715/801, 764
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,577,188	A	11/1996	Zhu et al.
5,608,872	A	3/1997	Schwartz et al.
5,649,104	A	7/1997	Carleton et al.
5,715,450	A	2/1998	Ambrose et al.
5,761,419	A	6/1998	Schwartz et al.
5,819,038	A	10/1998	Carleton et al.
5,821,937	A	10/1998	Tonelli et al.
5,831,610	A	11/1998	Tonelli et al.
5,873,096	A	2/1999	Lim et al.
5,918,159	A	6/1999	Fomukong et al.
5,963,953	A	10/1999	Cram et al.
6,092,083	A	7/2000	Brodersen et al.
6,161,149	A	12/2000	Achacoso et al.
6,169,534	B1	1/2001	Raffel et al.
6,178,425	B1	1/2001	Brodersen et al.
6,189,011	B1	2/2001	Lim et al.
6,216,135	B1	4/2001	Brodersen et al.
6,233,617	B1	5/2001	Rothwein et al.
6,266,669	B1	7/2001	Brodersen et al.
6,295,530	B1	9/2001	Ritchie et al.
6,324,568	B1	11/2001	Diec
6,324,693	B1	11/2001	Brodersen et al.
6,336,137	B1	1/2002	Lee et al.
D454,139	S	3/2002	Feldcamp
6,367,077	B1	4/2002	Brodersen et al.
6,393,605	B1	5/2002	Loomans
6,405,220	B1	6/2002	Brodersen et al.
6,434,550	B1	8/2002	Warner et al.
6,446,089	B1	9/2002	Brodersen et al.

(Continued)

OTHER PUBLICATIONS

MacDonald, Matthew. Excel 2003: The Missing Manual, Dec. 22, 2004, O'Reilly Media, p. 452.*

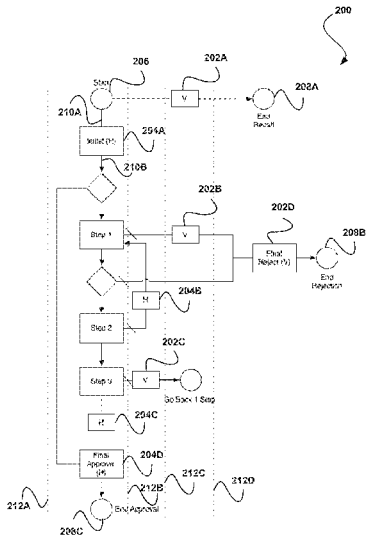
(Continued)

Primary Examiner — William Trapanese
(74) *Attorney, Agent, or Firm* — Zilka-Kotab, PC

(57) **ABSTRACT**

In accordance with embodiments, there are provided mechanisms and methods for interacting with a process diagram. These mechanisms and methods for interacting with a process diagram may allow for a user's enhanced interactive experience with the process diagram. The ability of embodiments to provide such enhancements may allow for improved navigation of the process diagram, searching of the process diagram, editing of the process diagram, etc.

12 Claims, 29 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

6,535,909	B1	3/2003	Rust	
6,549,908	B1	4/2003	Loomans	
6,553,563	B2	4/2003	Ambrose et al.	
6,560,461	B1	5/2003	Fomukong et al.	
6,574,635	B2	6/2003	Stauber et al.	
6,577,726	B1	6/2003	Huang et al.	
6,601,087	B1	7/2003	Zhu et al.	
6,604,117	B2	8/2003	Lim et al.	
6,604,128	B2	8/2003	Diec	
6,609,150	B2	8/2003	Lee et al.	
6,621,834	B1	9/2003	Scherpbier et al.	
6,654,032	B1	11/2003	Zhu et al.	
6,665,648	B2	12/2003	Brodersen et al.	
6,665,655	B1	12/2003	Warner et al.	
6,684,438	B2	2/2004	Brodersen et al.	
6,711,565	B1	3/2004	Subramaniam et al.	
6,724,399	B1	4/2004	Katchour et al.	
6,728,702	B1	4/2004	Subramaniam et al.	
6,728,960	B1	4/2004	Loomans	
6,732,095	B1	5/2004	Warshavsky et al.	
6,732,100	B1	5/2004	Brodersen et al.	
6,732,111	B2	5/2004	Brodersen et al.	
6,754,681	B2	6/2004	Brodersen et al.	
6,763,351	B1	7/2004	Subramaniam et al.	
6,763,501	B1	7/2004	Zhu et al.	
6,768,904	B2	7/2004	Kim	
6,772,229	B1	8/2004	Achacoso et al.	
6,782,383	B2	8/2004	Subramaniam et al.	
6,804,330	B1	10/2004	Jones et al.	
6,826,565	B2	11/2004	Ritchie et al.	
6,826,582	B1	11/2004	Chatterjee et al.	
6,826,745	B2	11/2004	Coker et al.	
6,829,655	B1	12/2004	Huang et al.	
6,842,748	B1	1/2005	Warner	
6,850,895	B2	2/2005	Brodersen et al.	
6,850,949	B2	2/2005	Warner et al.	
7,062,502	B1	6/2006	Kesler	
7,069,231	B1	6/2006	Cinarkaya et al.	
7,181,758	B1	2/2007	Chan	
7,209,929	B2	4/2007	Dominguez, Jr. et al.	707/103
7,289,976	B2	10/2007	Kihneman et al.	
7,340,411	B2	3/2008	Cook	
7,356,482	B2	4/2008	Frankland et al.	
7,401,094	B1	7/2008	Kesler	
7,412,455	B2	8/2008	Dillon	
7,508,789	B2	3/2009	Chan	
7,620,655	B2	11/2009	Larsson et al.	
7,698,160	B2	4/2010	Beaven et al.	
7,779,039	B2	8/2010	Weissman et al.	
7,904,322	B2 *	3/2011	Gauger	705/7.13
8,015,495	B2	9/2011	Achacoso et al.	
8,082,301	B2	12/2011	Ahlgren et al.	
8,095,413	B1	1/2012	Beaven	
8,095,594	B2	1/2012	Beaven et al.	
8,275,836	B2	9/2012	Beaven et al.	
8,457,545	B2	6/2013	Chan	
8,484,111	B2	7/2013	Frankland et al.	
2001/0044791	A1	11/2001	Richter et al.	
2002/0022986	A1	2/2002	Coker et al.	
2002/0029161	A1	3/2002	Brodersen et al.	
2002/0029376	A1	3/2002	Ambrose et al.	
2002/0035577	A1	3/2002	Brodersen et al.	
2002/0042264	A1	4/2002	Kim	
2002/0042843	A1	4/2002	Diec	
2002/0072951	A1	6/2002	Lee et al.	
2002/0082892	A1	6/2002	Raffel et al.	
2002/0129352	A1	9/2002	Brodersen et al.	
2002/0140731	A1	10/2002	Subramaniam et al.	
2002/0143997	A1	10/2002	Huang et al.	
2002/0162090	A1	10/2002	Parnell et al.	
2002/0165742	A1	11/2002	Robins	
2003/0004971	A1	1/2003	Gong et al.	
2003/0018705	A1	1/2003	Chen et al.	
2003/0018830	A1	1/2003	Chen et al.	
2003/0066031	A1	4/2003	Laane	
2003/0066032	A1	4/2003	Ramachandran et al.	
2003/0069936	A1	4/2003	Warner et al.	
2003/0070000	A1	4/2003	Coker et al.	
2003/0070004	A1	4/2003	Mukundan et al.	
2003/0070005	A1	4/2003	Mukundan et al.	
2003/0074418	A1	4/2003	Coker	
2003/0120675	A1	6/2003	Stauber et al.	
2003/0151633	A1	8/2003	George et al.	
2003/0159136	A1	8/2003	Huang et al.	
2003/0187921	A1	10/2003	Diec	
2003/0189600	A1	10/2003	Gune et al.	
2003/0204427	A1	10/2003	Gune et al.	
2003/0206192	A1	11/2003	Chen et al.	
2003/0225730	A1	12/2003	Warner et al.	
2003/0233404	A1	12/2003	Hopkins	709/203
2004/0001092	A1	1/2004	Rothwein et al.	
2004/0010489	A1	1/2004	Rio	
2004/0015981	A1	1/2004	Coker et al.	
2004/0027388	A1	2/2004	Berg et al.	
2004/0128001	A1	7/2004	Levin et al.	
2004/0186860	A1	9/2004	Lee et al.	
2004/0193510	A1	9/2004	Catahan, Jr. et al.	
2004/0199489	A1	10/2004	Barnes-Leon et al.	
2004/0199536	A1	10/2004	Barnes Leon et al.	
2004/0199543	A1	10/2004	Braud et al.	
2004/0249854	A1	12/2004	Barnes-Leon et al.	
2004/0260534	A1	12/2004	Pak et al.	
2004/0260659	A1	12/2004	Chan et al.	
2004/0268299	A1	12/2004	Lei et al.	
2005/0050555	A1	3/2005	Exley et al.	
2005/0065925	A1	3/2005	Weissman et al.	707/4
2005/0091098	A1	4/2005	Brodersen et al.	
2005/0223022	A1	10/2005	Weissman et al.	
2005/0283478	A1	12/2005	Choi et al.	707/9
2006/0021019	A1	1/2006	Hinton et al.	
2006/0206834	A1	9/2006	Fisher et al.	715/777
2007/0168943	A1 *	7/2007	Marini et al.	717/108
2008/0010243	A1	1/2008	Weissman et al.	707/2
2008/0249972	A1	10/2008	Dillon	
2009/0063415	A1	3/2009	Chatfield et al.	
2009/0100342	A1	4/2009	Jakobson	
2009/0177744	A1	7/2009	Marlow et al.	
2011/0029102	A1 *	2/2011	Campney et al.	700/83
2011/0218958	A1	9/2011	Warshavsky et al.	
2011/0247051	A1	10/2011	Bulumulla et al.	
2011/0302551	A1 *	12/2011	Hummel, Jr.	717/105
2012/0042218	A1	2/2012	Cinarkaya et al.	
2013/0218948	A1	8/2013	Jakobson	
2013/0218949	A1	8/2013	Jakobson	
2013/0247216	A1	9/2013	Cinarkaya et al.	
2014/0359537	A1	12/2014	Jackobson et al.	
2015/0006289	A1	1/2015	Jakobson et al.	
2015/0007050	A1	1/2015	Jakobson et al.	
2015/0095162	A1	4/2015	Jakobson et al.	

OTHER PUBLICATIONS

Biafore, Bonnie. Visio 2007 Bible, Apr. 2, 2007, John Wiley & Sons, pp. 32-33, 57-59, 439-440, and 571.*

Lee, Mikyu et al., StarUML 5.0 User Guide, 2005, http://staruml.sourceforge.net/docs/user-guide(en)/toc.html.*

PowerDesigner v12.1. Jun. 2006, Sybase, http://infocenter.sybase.com/archive/index.jsp?topic=/com.sybase.stf.powerdesigner.docs_12.1.0/title.htm.*

MyEclipse UML (MyUML) Quickstart, Aug. 31, 2005, http://read.pudn.com/downloads95/ebook/382011/MyEclipse_UML_Quickstart.pdf.*

Topcased 2.5 UML Editor Tutorial, Oct. 5, 2009, http://web.archive.org/web/20091015020152/http://gforge.enseeiht.fr/docman/view.php/7/2224/TPC_2.5_UML_editor_tutorial.pdf.*

Bell, Donald. UML basics Part II: The activity diagram, 2003, http://www.ibm.com/developerworks/rational/library/content/RationalEdge/sep03/f_umlbasics_db.pdf.*

U.S. Appl. No. 60/828,192, which was filed on Oct. 4, 2006.

* cited by examiner

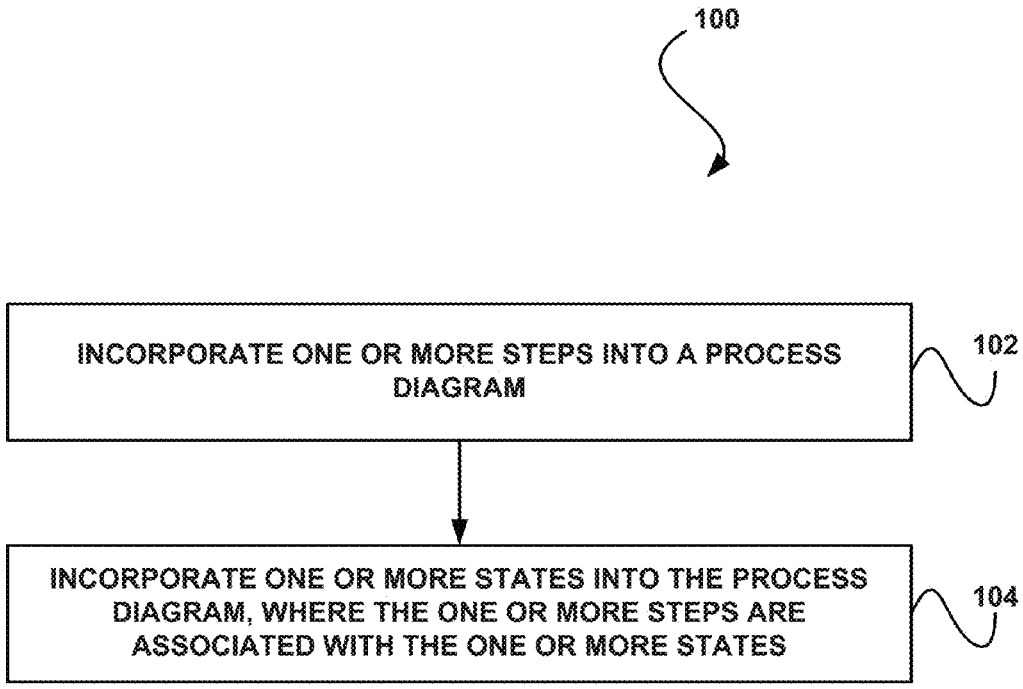

100
INCORPORATE ONE OR MORE STEPS INTO A PROCESS DIAGRAM
102
INCORPORATE ONE OR MORE STATES INTO THE PROCESS DIAGRAM, WHERE THE ONE OR MORE STEPS ARE ASSOCIATED WITH THE ONE OR MORE STATES
104

FIGURE 1

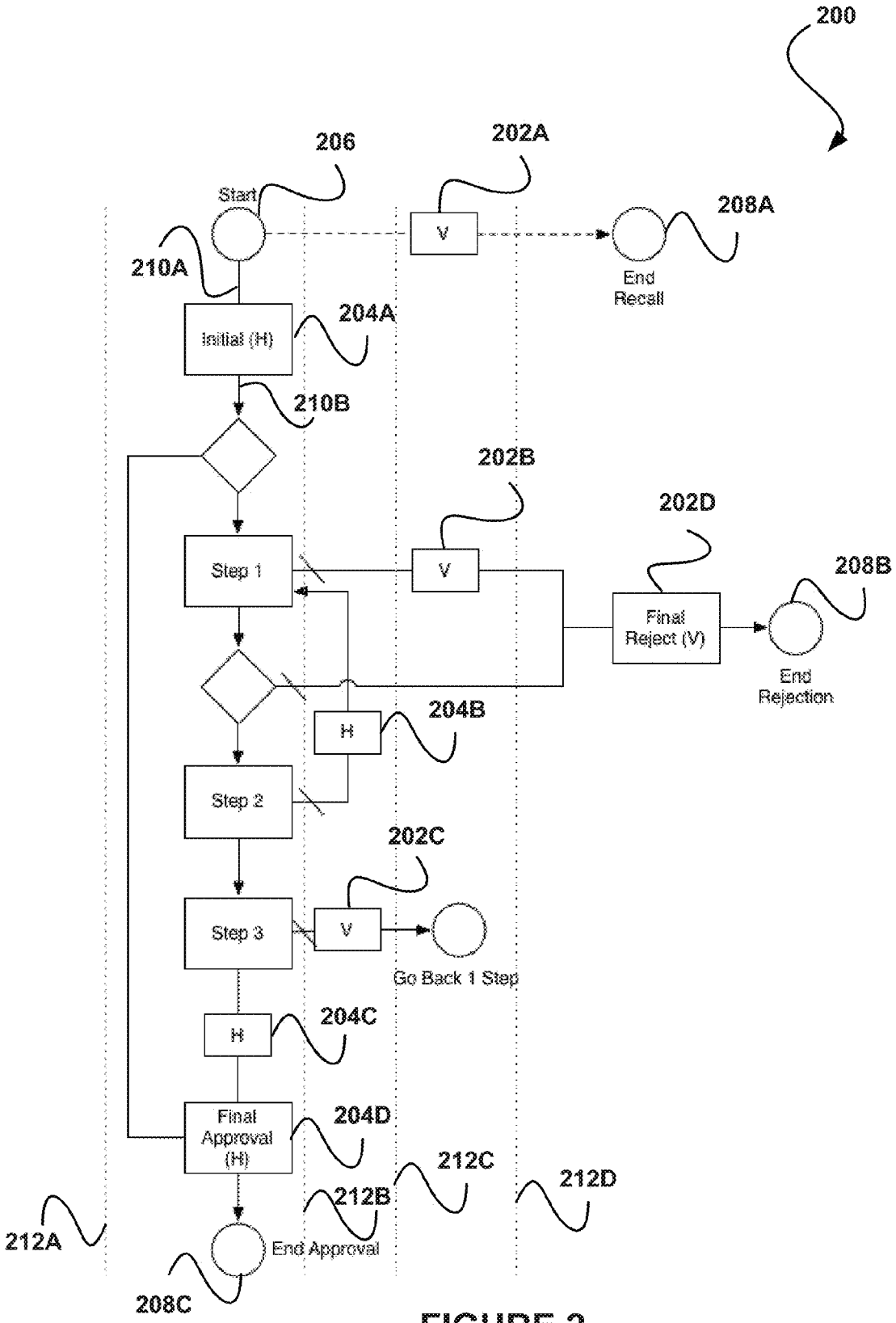

200
206
202A
Start
V
208A
End Recall
210A
Initial (H)
204A
210B
202B
202D
Step 1
V
208B
Final Reject (V)
End Rejection
H
204B
Step 2
202C
Step 3
V
Go Back 1 Step
H
204C
Final Approval (H)
204D
212C
212D
212B
212A
End Approval
208C

FIGURE 2

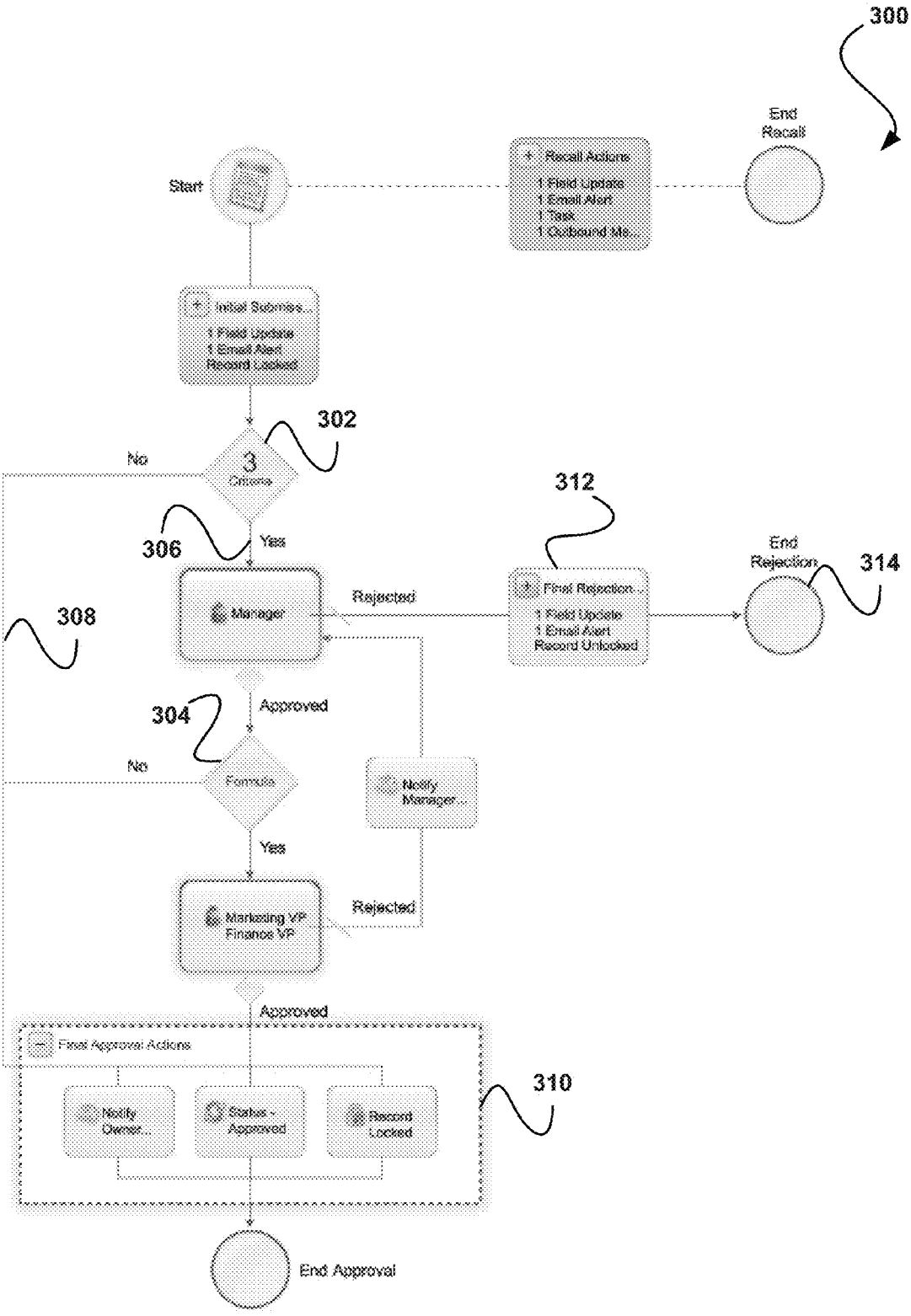

300
End
Recall
Start
Recall Actions
1 Field Update
1 Email Alert
1 Task
1 Outbound Me...
Initial Submiss...
1 Field Update
1 Email Alert
Record Locked
302
No
3
Criteria
312
306
Yes
End
Rejection
314
Final Rejection...
1 Field Update
1 Email Alert
Record Unlocked
Manager
Rejected
308
304
Approved
No
Formula
Notify
Manager...
Yes
Marketing VP
Finance VP
Rejected
Approved
Final Approval Actions
310
Notify
Owner...
Status -
Approved
Record
Locked
End Approval

FIGURE 3

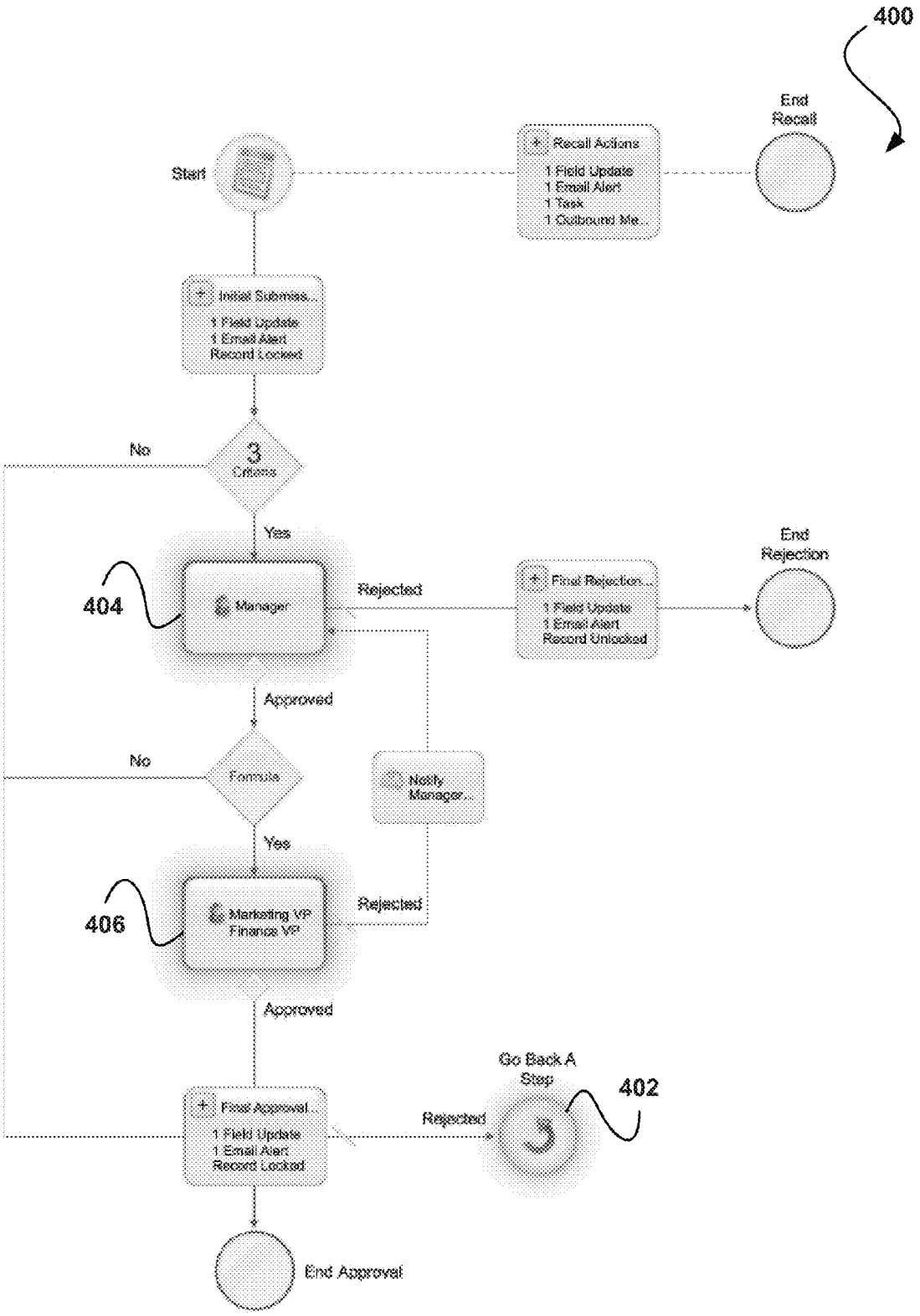

400
End Recall
Start
Recall Actions
1 Field Update
1 Email Alert
1 Task
1 Outbound Me...
Initial Submiss...
1 Field Update
1 Email Alert
Record Locked
No
3 Criteria
Yes
404
Manager
Rejected
Final Rejection...
1 Field Update
1 Email Alert
Record Unlocked
End Rejection
Approved
No
Formula
Notify Manager...
Yes
406
Marketing VP
Finance VP
Rejected
Approved
Go Back A Step
402
Final Approval...
1 Field Update
1 Email Alert
Record Locked
Rejected
End Approval

FIGURE 4

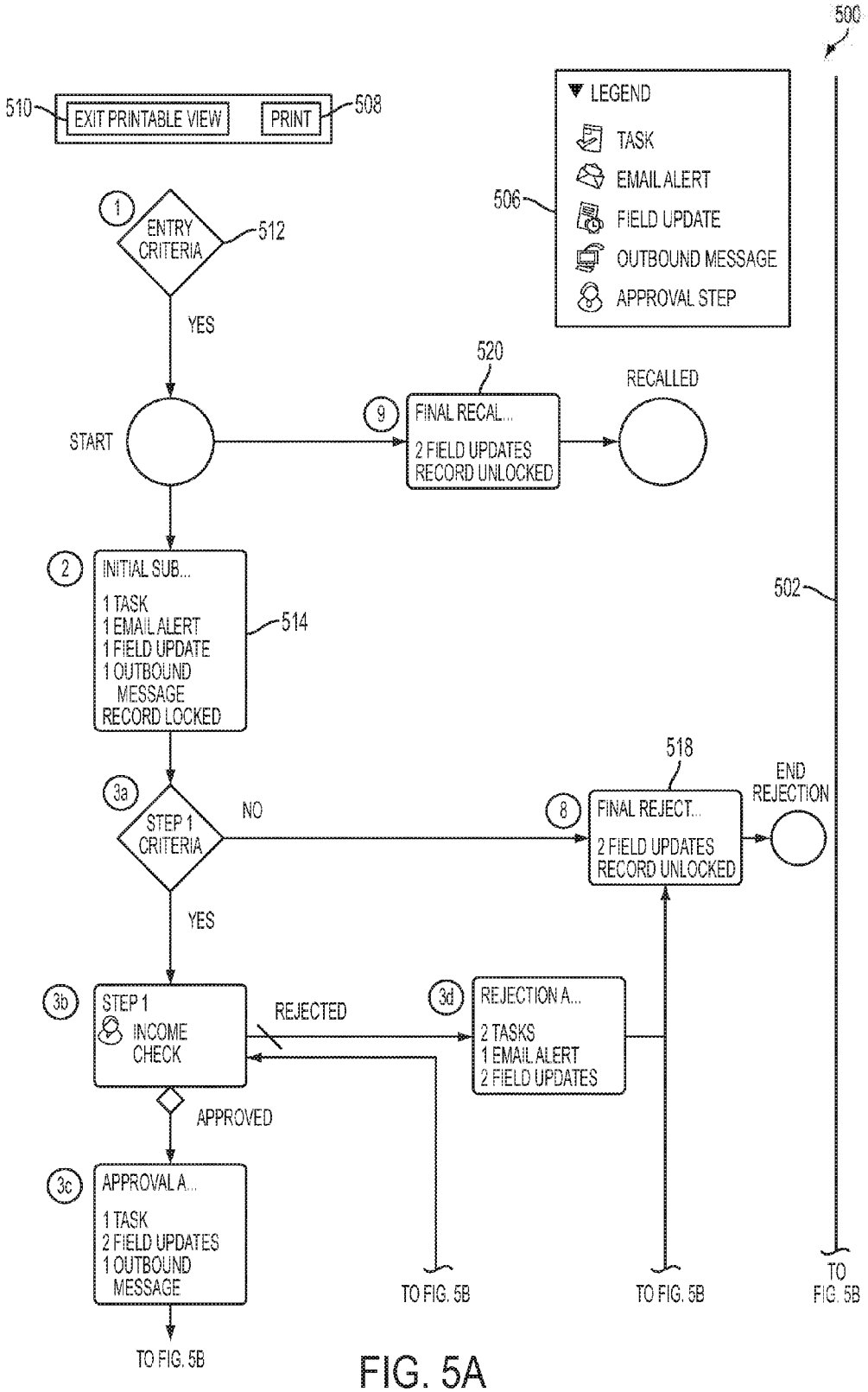

500
510
EXIT PRINTABLE VIEW
PRINT
508
LEGEND
TASK
EMAIL ALERT
FIELD UPDATE
OUTBOUND MESSAGE
APPROVAL STEP
506
1
ENTRY CRITERIA
512
YES
520
RECALLED
START
9
FINAL RECAL...
2 FIELD UPDATES
RECORD UNLOCKED
2
INITIAL SUB...
1 TASK
1 EMAIL ALERT
1 FIELD UPDATE
1 OUTBOUND MESSAGE
RECORD LOCKED
514
502
518
END REJECTION
3a
STEP 1 CRITERIA
NO
8
FINAL REJECT...
2 FIELD UPDATES
RECORD UNLOCKED
YES
3b
STEP 1
INCOME CHECK
REJECTED
3d
REJECTION A...
2 TASKS
1 EMAIL ALERT
2 FIELD UPDATES
APPROVED
3c
APPROVAL A...
1 TASK
2 FIELD UPDATES
1 OUTBOUND MESSAGE
TO FIG. 5B
TO FIG. 5B
TO FIG. 5B
TO FIG. 5B

FIG. 5A

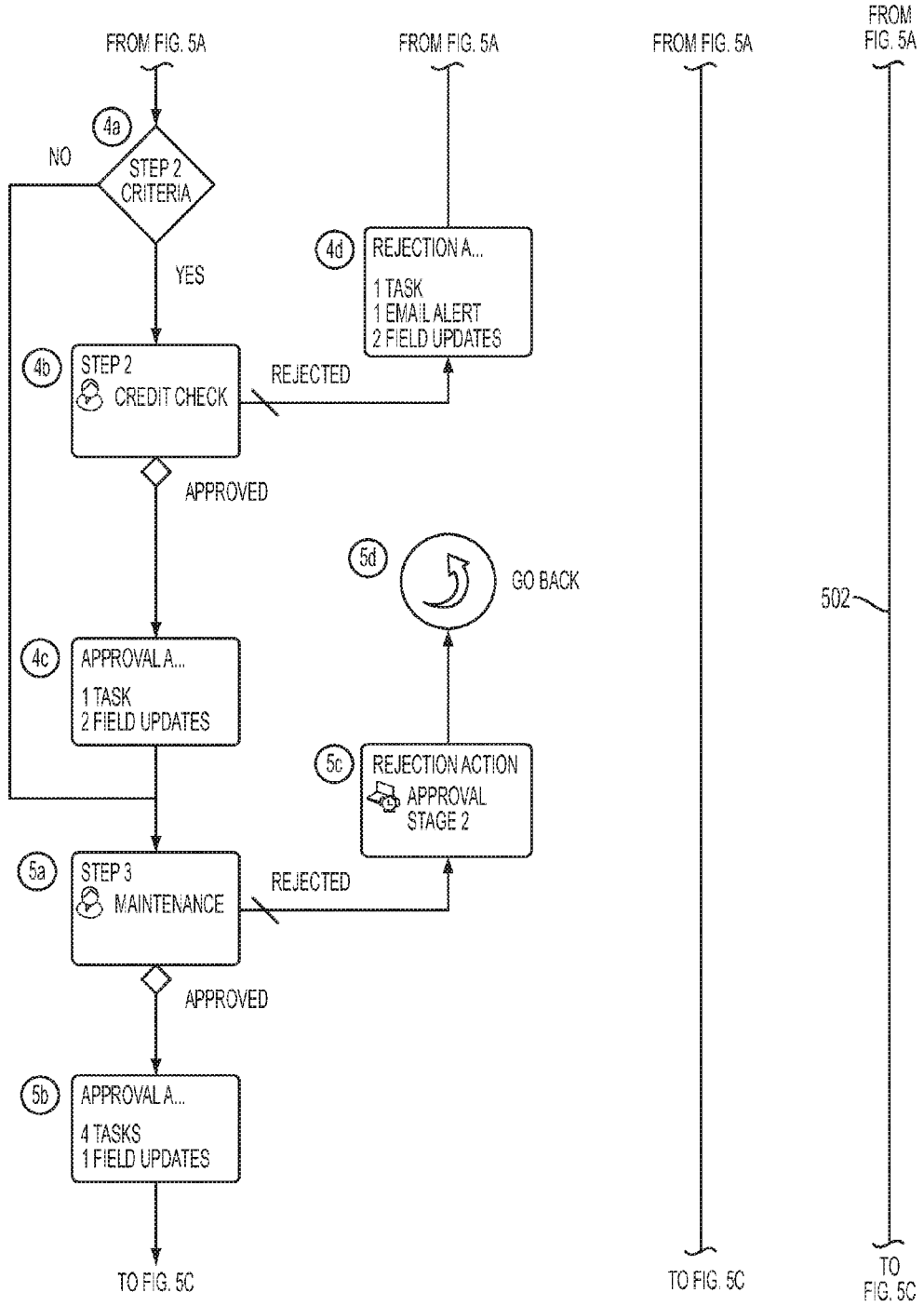

FROM FIG. 5A
FROM FIG. 5A
FROM FIG. 5A
FROM FIG. 5A
4a
STEP 2 CRITERIA
NO
YES
4d
REJECTION A...
1 TASK
1 EMAIL ALERT
2 FIELD UPDATES
4b
STEP 2
CREDIT CHECK
REJECTED
APPROVED
5d
GO BACK
502
4c
APPROVAL A...
1 TASK
2 FIELD UPDATES
5c
REJECTION ACTION
APPROVAL STAGE 2
5a
STEP 3
MAINTENANCE
REJECTED
APPROVED
5b
APPROVAL A...
4 TASKS
1 FIELD UPDATES
TO FIG. 5C
TO FIG. 5C
TO FIG. 5C

FIG. 5B

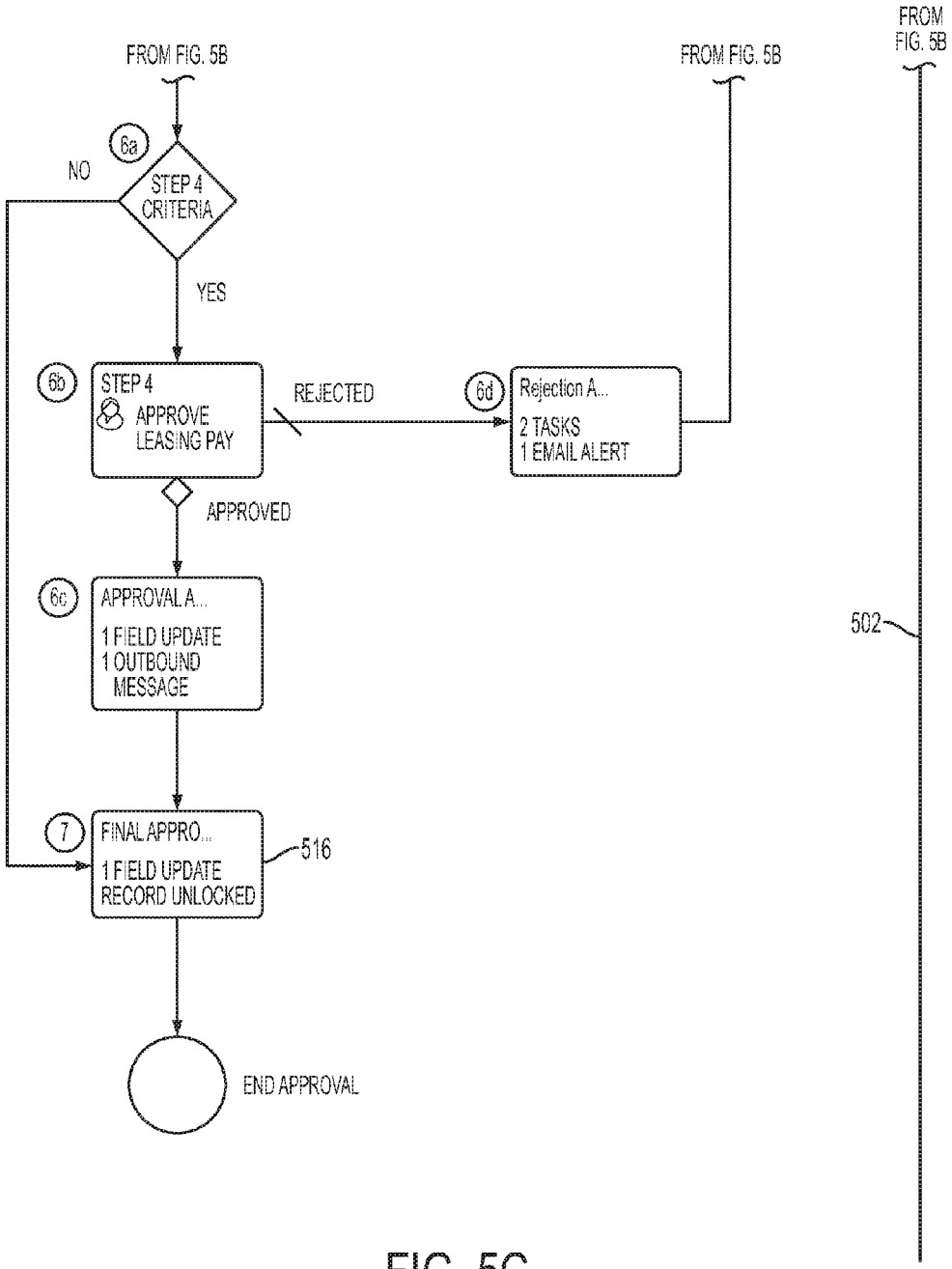

FROM FIG. 5B
FROM FIG. 5B
FROM FIG. 5B
6a
NO
STEP 4 CRITERIA
YES
6b
STEP 4
APPROVE LEASING PAY
REJECTED
6d
Rejection A...
2 TASKS
1 EMAIL ALERT
APPROVED
6c
APPROVAL A...
1 FIELD UPDATE
1 OUTBOUND MESSAGE
7
FINAL APPRO...
1 FIELD UPDATE
RECORD UNLOCKED
516
END APPROVAL
502

FIG. 5C

500

Campaign: Campaign Approval Process

Process name	Campaign Approval Process	**Active**	No
Description		**Next Automated Approver Determined By**	Manager of Record Submitter
Record Editability	Administrator **ONLY**	**Allow Submitters to Recall Approval Requests**	No
Approval Assignment Email Template	Workflow - Approvals		
Initial Submitters	Campaign Owner		
Created By	Admin User, 11/11/2008 10:39 AM	**Modified By**	Admin User, 1/12/2009 3:54PM

504

① Entry Criteria

Lead.Application_Received__c = true
Lead.AnnualRevenue != null

② Initial Submission Actions

Type	Name	Details
Task	Follow in 30	Assign task to Owner, due 30 days after Lead.Created Date
Email Alert	New Application Alert	Send Leads: New assignment notification (SAMPLE) email to: User: admin@wf.ee.com
Field Update	pending approval	Update App__c with value: Pending
Outbound Message	SAP OBM	Send the fields:, Agent_Bonus__c, AnnualRevenue, App__c, Application_Received__c, City, Company, ConvertedAccountId, ConvertedContactId, ConvertedDate, ConvertedOpportunityId, Country, CreatedById, CreatedDate, Credit_Score__c, Depo__c, Deposit_Received__c, Deposit_Waived__c, Description, DoNotCall, Email, Id to endpoint: http://ghart-ws:8080
Record Lock		Lock the record from being edited

③ Step 1: Income Check

Description	
Reject Behavior	Final Rejection

TO FIG. 5E

TO FIG. 5E

FIG. 5D

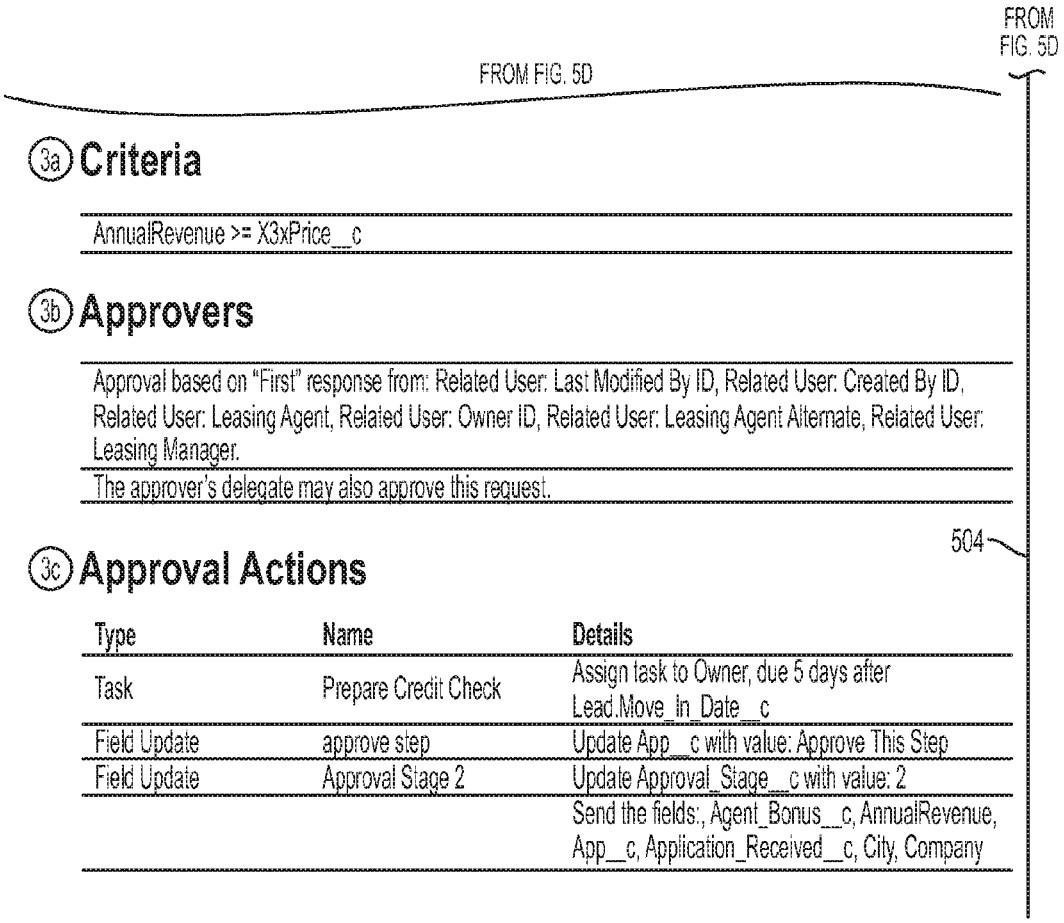

FROM FIG. 5D
FROM FIG. 5D
3a Criteria
AnnualRevenue >= X3xPrice__c
3b Approvers
Approval based on "First" response from: Related User: Last Modified By ID, Related User: Created By ID, Related User: Leasing Agent, Related User: Owner ID, Related User: Leasing Agent Alternate, Related User: Leasing Manager.
The approver's delegate may also approve this request.
504
3c Approval Actions
Type
Name
Details
Task
Prepare Credit Check
Assign task to Owner, due 5 days after Lead.Move_In_Date__c
Field Update
approve step
Update App__c with value: Approve This Step
Field Update
Approval Stage 2
Update Approval_Stage__c with value: 2
Send the fields:, Agent_Bonus__c, AnnualRevenue, App__c, Application_Received__c, City, Company

FIG. 5E

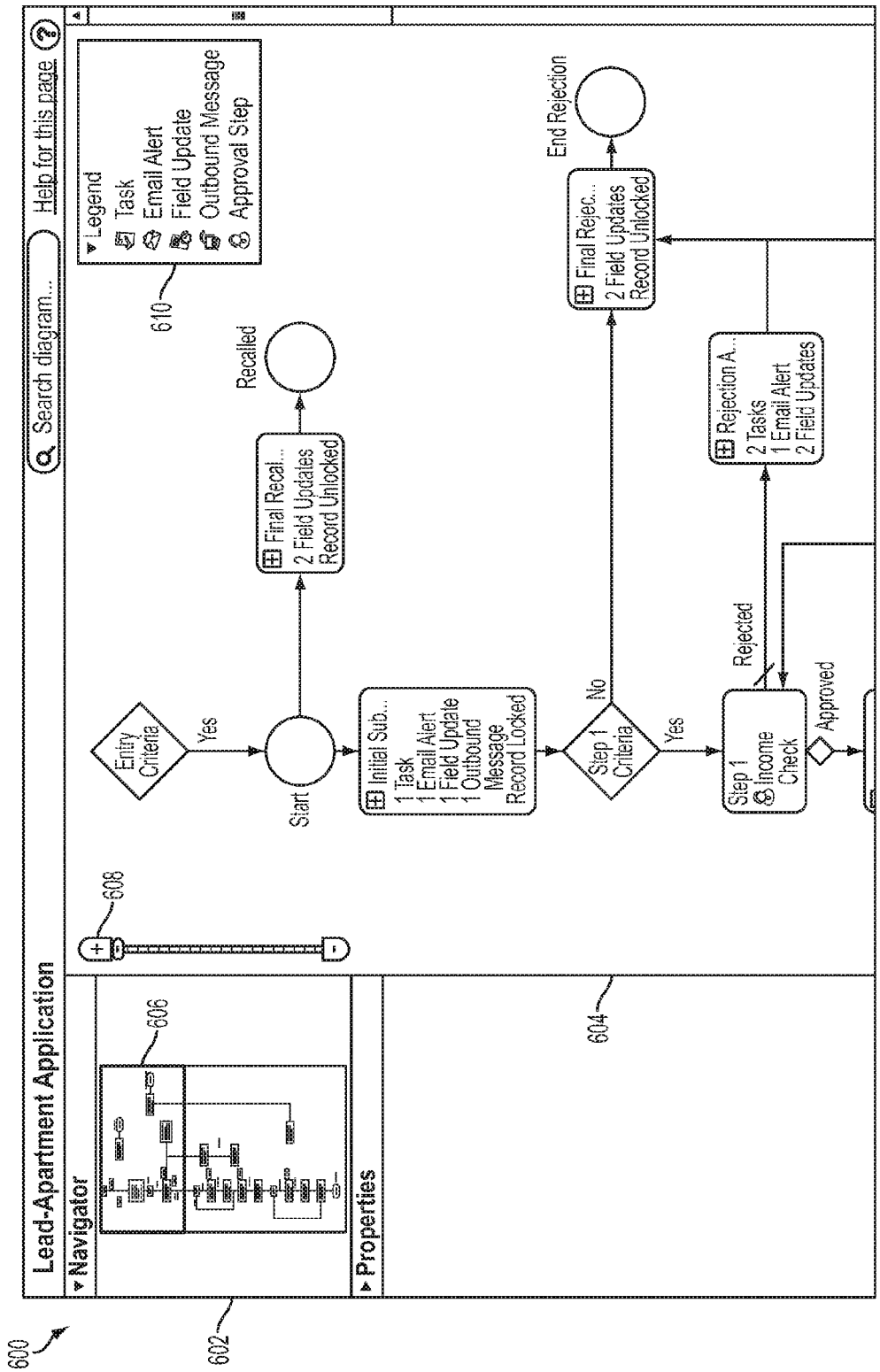

600
602
Lead-Apartment Application
Search diagram...
Help for this page
Navigator
Properties
606
608
604
610
Legend
Task
Email Alert
Field Update
Outbound Message
Approval Step
Entry Criteria
Yes
Start
Initial Sub...
1 Task
1 Email Alert
1 Field Update
1 Outbound Message
Record Locked
Final Recal...
2 Field Updates
Record Unlocked
Recalled
Step 1 Criteria
No
Yes
Final Rejec...
2 Field Updates
Record Unlocked
End Rejection
Step 1
Income Check
Rejected
Approved
Rejection A...
2 Tasks
1 Email Alert
2 Field Updates

FIG. 6

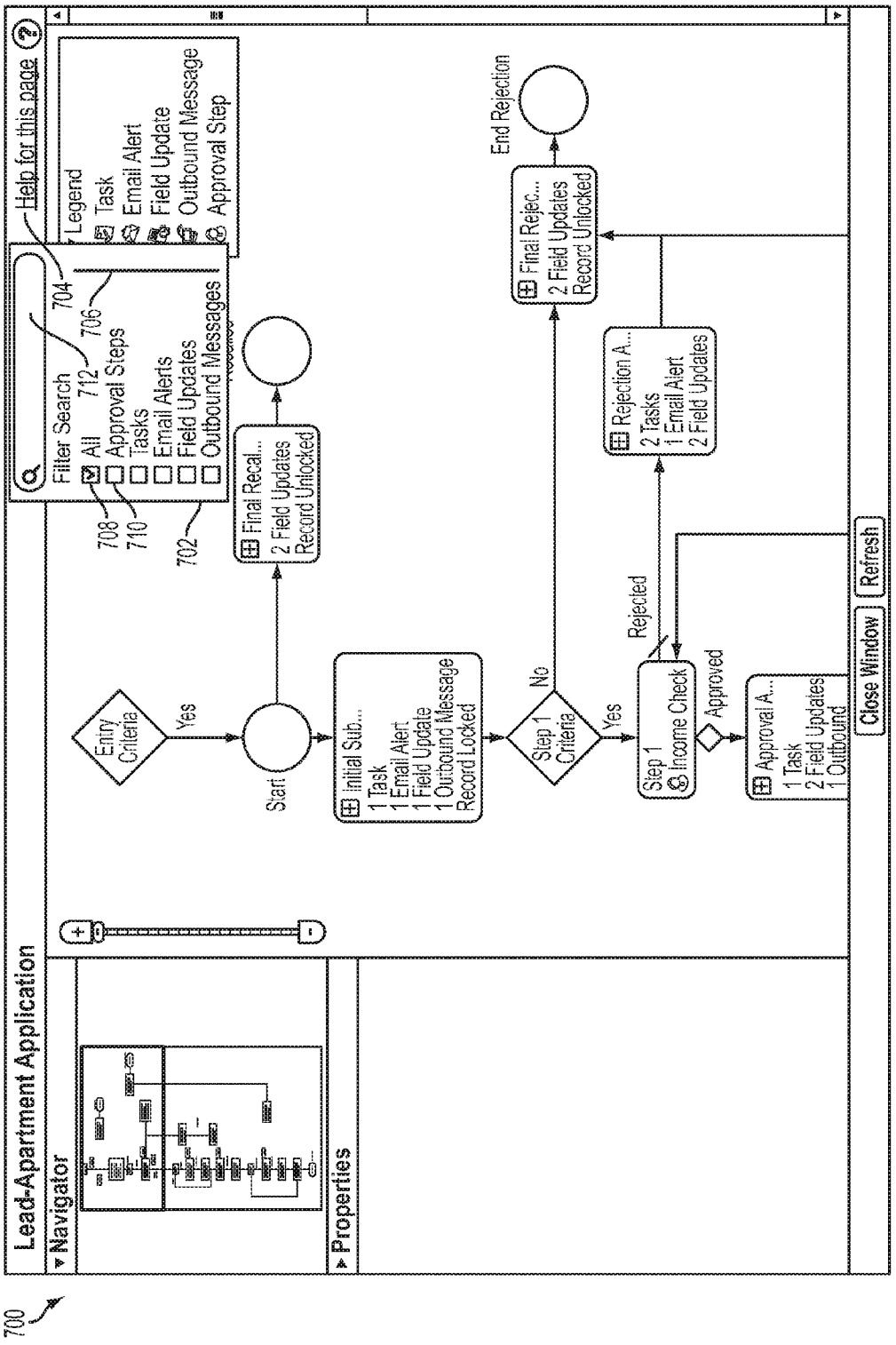

700
Lead-Apartment Application
Navigator
Properties
Help for this page
Filter Search
All
Approval Steps
Tasks
Email Alerts
Field Updates
Outbound Messages
704
706
712
708
710
702
Legend
Task
Email Alert
Field Update
Outbound Message
Approval Step
Entry Criteria
Yes
Start
Final Recal...
2 Field Updates
Record Unlocked
initial Sub...
1 Task
1 Email Alert
1 Field Update
1 Outbound Message
Record Locked
Step 1 Criteria
No
Yes
Final Rejec...
2 Field Updates
Record Unlocked
End Rejection
Rejected
Step 1
Income Check
Approved
Rejection A...
2 Tasks
1 Email Alert
2 Field Updates
Approval A...
1 Task
2 Field Updates
1 Outbound
Close Window
Refresh

FIG. 7

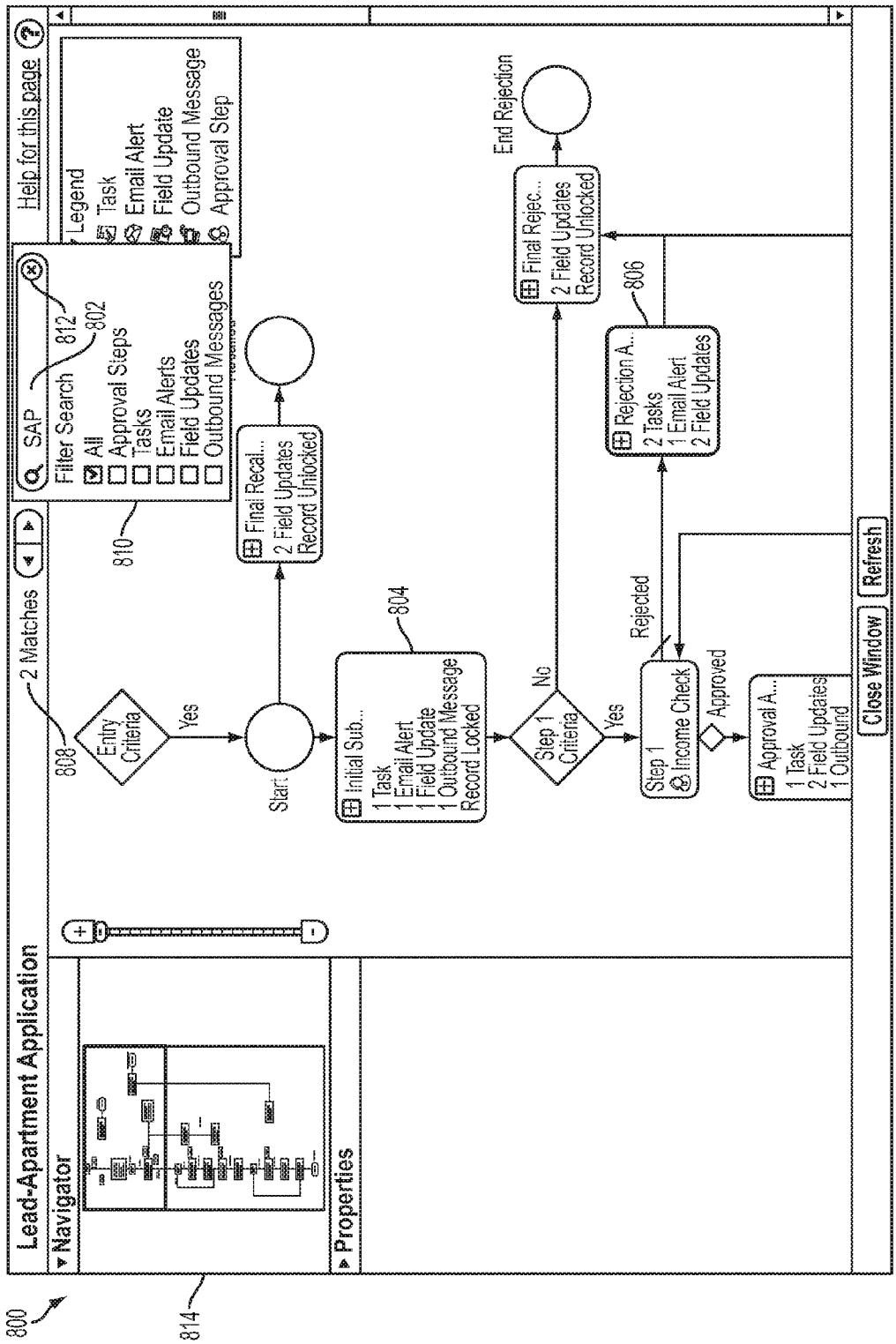

800
814
Lead-Apartment Application
Navigator
Properties
2 Matches
808
Entry Criteria
Yes
Start
Help for this page
Legend
Task
Email Alert
Field Update
Outbound Message
Approval Step
SAP
Filter Search
812
802
All
Approval Steps
Tasks
Email Alerts
Field Updates
Outbound Messages
810
Final Recal...
2 Field Updates
Record Unlocked
804
Initial Sub...
1 Task
1 Email Alert
1 Field Update
1 Outbound Message
Record Locked
Step 1 Criteria
No
Yes
End Rejection
Final Rejec...
2 Field Updates
Record Unlocked
806
Rejection A...
2 Tasks
1 Email Alert
2 Field Updates
Rejected
Step 1
Income Check
Approved
Approval A...
1 Task
2 Field Updates
1 Outbound
Close Window
Refresh

FIG. 8

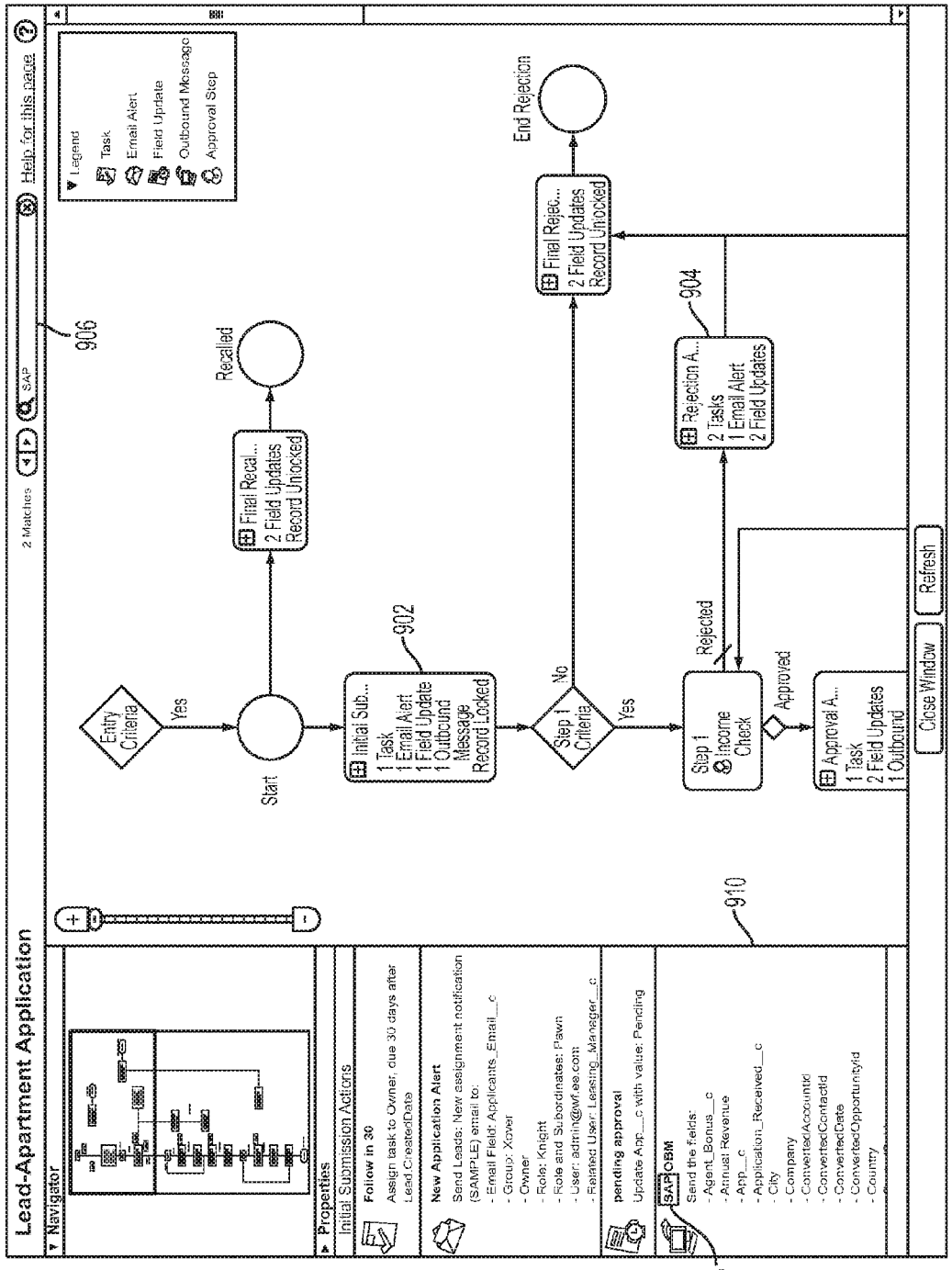

900
Lead-Apartment Application
Navigator
Properties
Initial Submission Actions
Follow in 30
Assign task to Owner, due 30 days after LeadCreatedDate
New Application Alert
Send Leads: New assignment notification (SAMPLE) email to:
- Email Field: Applicants_Email__c
- Group: Xavier
- Owner
- Role: Knight
- Role and Subordinates: Pawn
- User: admin@gwl.ee.com
- Related User: Leasing_Manager__c
pending approval
Update App__c with value: Pending
SAP OBM
Send the Fields:
- Agent_Bonus__c
- Annual Revenue
- App__c
- Application_Received__c
- City
- Company
- ConvertedAccountId
- ConvertedContactId
- ConvertedDate
- ConvertedOpportunityId
- Country
908
910
2 Matches
SAP
Help for this page
906
Legend
Task
Email Alert
Field Update
Outbound Message
Approval Step
Entry Criteria
Yes
Start
Recalled
Final Recal...
2 Field Updates
Record Unlocked
Initial Sub...
1 Task
1 Email Alert
1 Field Update
1 Outbound Message
Record Locked
902
Step 1 Criteria
No
Yes
Final Rejec...
2 Field Updates
Record Unlocked
End Rejection
Step 1 Income Check
Rejected
Approved
Rejection A...
2 Tasks
1 Email Alert
2 Field Updates
904
Approval A...
1 Task
2 Field Updates
1 Outbound
Close Window
Refresh

FIG. 9

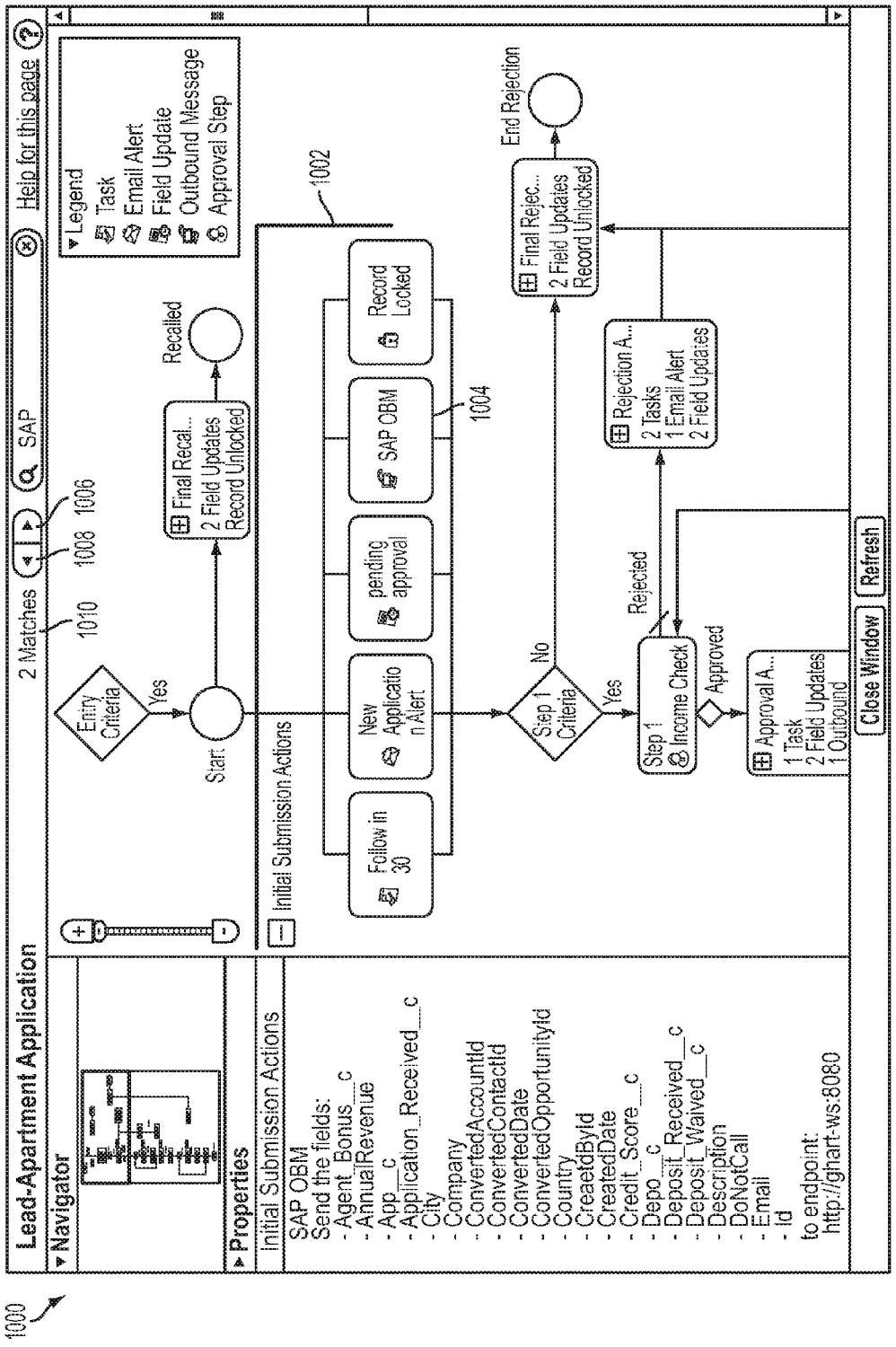

1000
Lead-Apartment Application
Help for this page
SAP
2 Matches
1010
1008
1006
Navigator
Properties
Initial Submission Actions
SAP OBM
Send the fields:
- Agent_Bonus__c
- AnnualRevenue
- App__c
- Application_Received__c
- City
- Company
- ConvertedAccountId
- ConvertedContactId
- ConvertedDate
- ConvertedOpportunityId
- Country
- CreatedById
- CreatedDate
- Credit_Score__c
- Depo__c
- Deposit_Received__c
- Deposit_Waived__c
- Description
- DoNotCall
- Email
- Id
to endpoint:
http://ghart-ws:8080
Entry Criteria
Yes
Start
Final Recal...
2 Field Updates
Record Unlocked
Recalled
Legend
Task
Email Alert
Field Update
Outbound Message
Approval Step
Initial Submission Actions
1002
Follow in 30
New Applicatio n Alert
pending approval
SAP OBM
Record Locked
1004
Step 1 Criteria
No
Yes
Final Rejec...
2 Field Updates
Record Unlocked
End Rejection
Rejected
Step 1
Income Check
Approved
Rejection A...
2 Tasks
1 Email Alert
2 Field Updates
Approval A...
1 Task
2 Field Updates
1 Outbound
Close Window
Refresh

FIG. 10

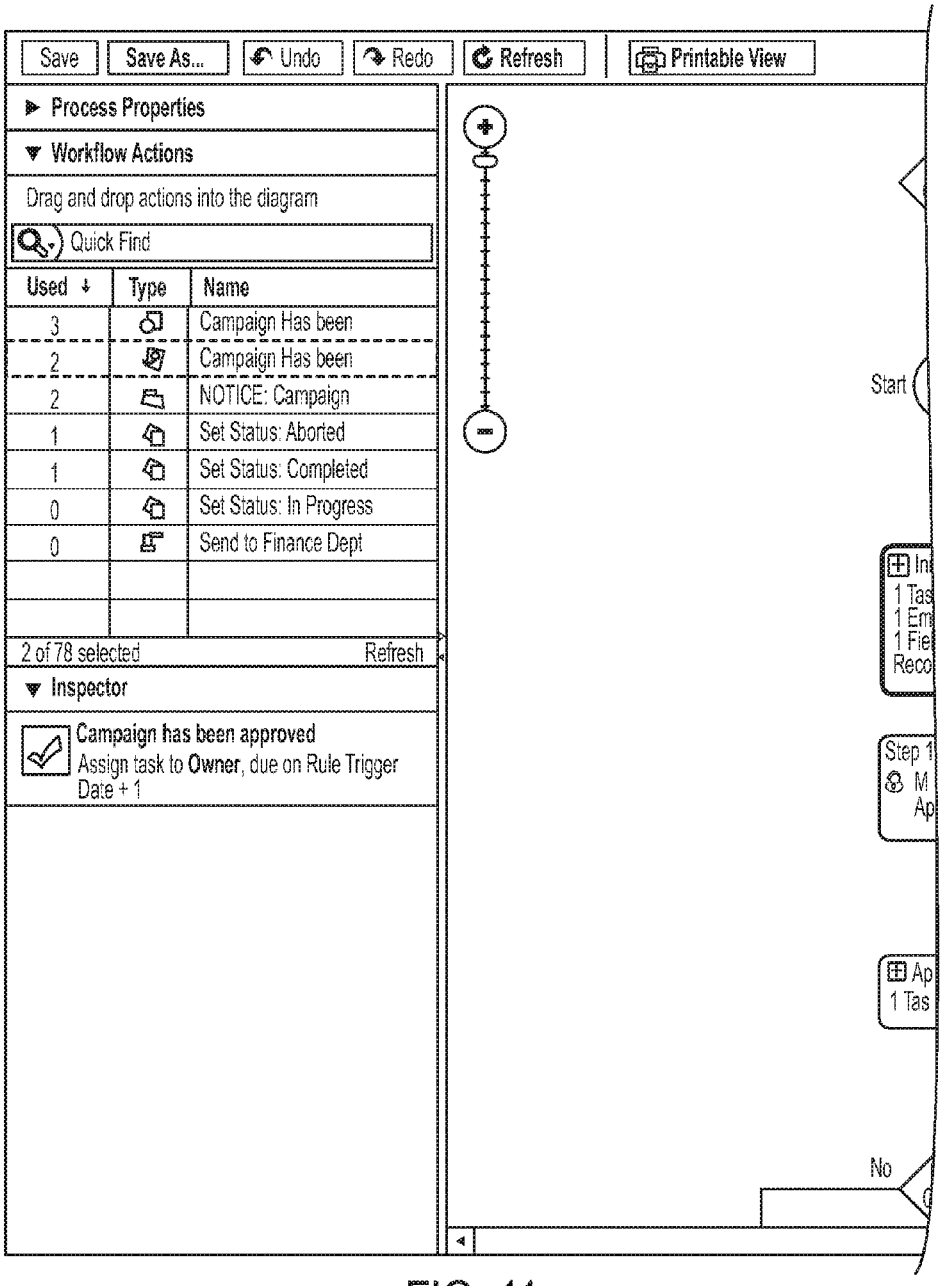

Save
Save As...
Undo
Redo
Refresh
Printable View
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3 Campaign Has been
2 Campaign Has been
2 NOTICE: Campaign
1 Set Status: Aborted
1 Set Status: Completed
0 Set Status: In Progress
0 Send to Finance Dept
2 of 78 selected
Refresh
Inspector
Campaign has been approved
Assign task to Owner, due on Rule Trigger Date + 1
Start
No

FIG. 11

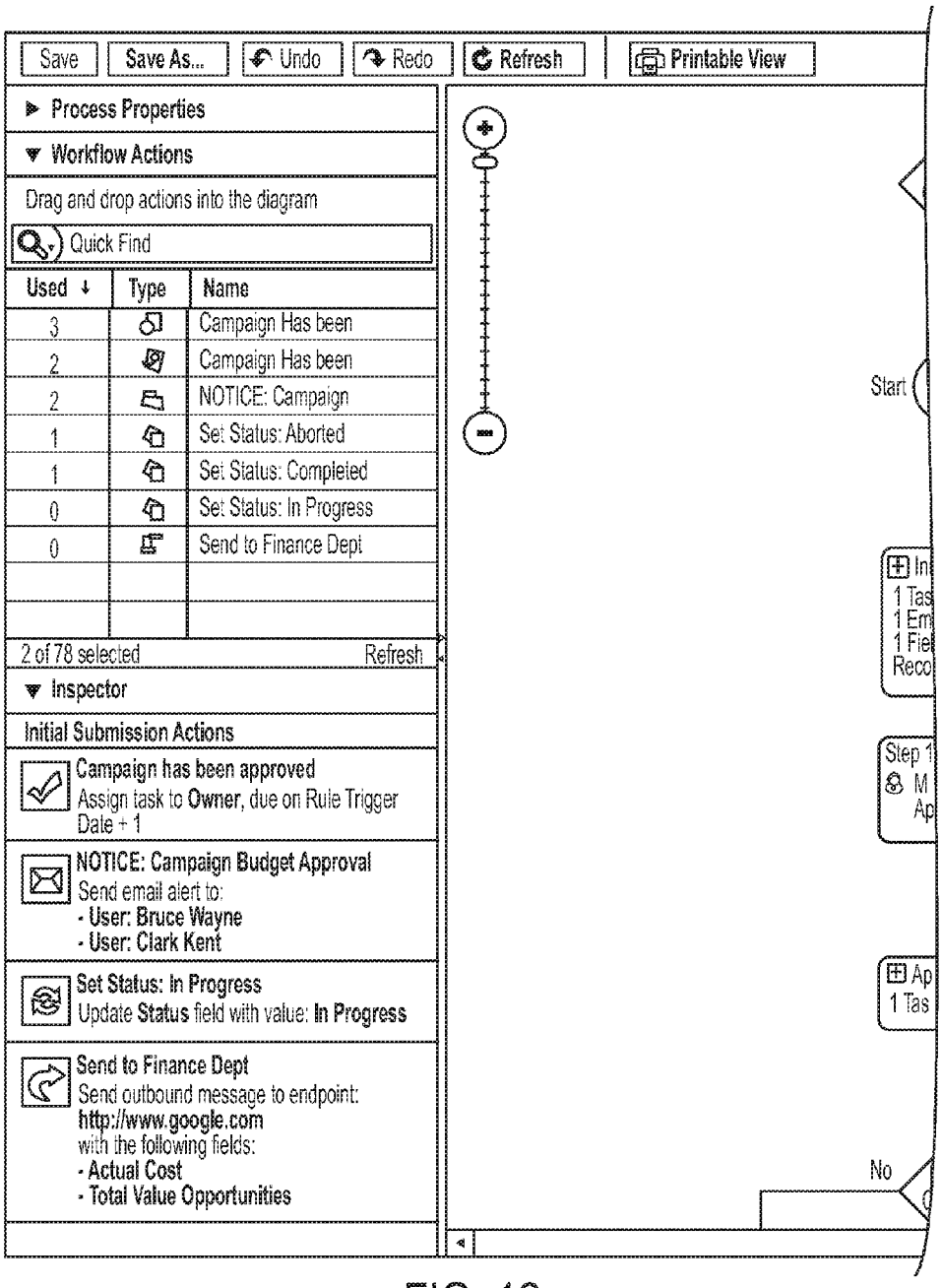

Save
Save As...
Undo
Redo
Refresh
Printable View
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3 Campaign Has been
2 Campaign Has been
2 NOTICE: Campaign
1 Set Status: Aborted
1 Set Status: Completed
0 Set Status: In Progress
0 Send to Finance Dept
2 of 78 selected
Refresh
Inspector
Initial Submission Actions
Campaign has been approved
Assign task to Owner, due on Rule Trigger Date + 1
NOTICE: Campaign Budget Approval
Send email alert to:
- User: Bruce Wayne
- User: Clark Kent
Set Status: In Progress
Update Status field with value: In Progress
Send to Finance Dept
Send outbound message to endpoint:
http://www.google.com
with the following fields:
- Actual Cost
- Total Value Opportunities
Start
No

FIG. 12

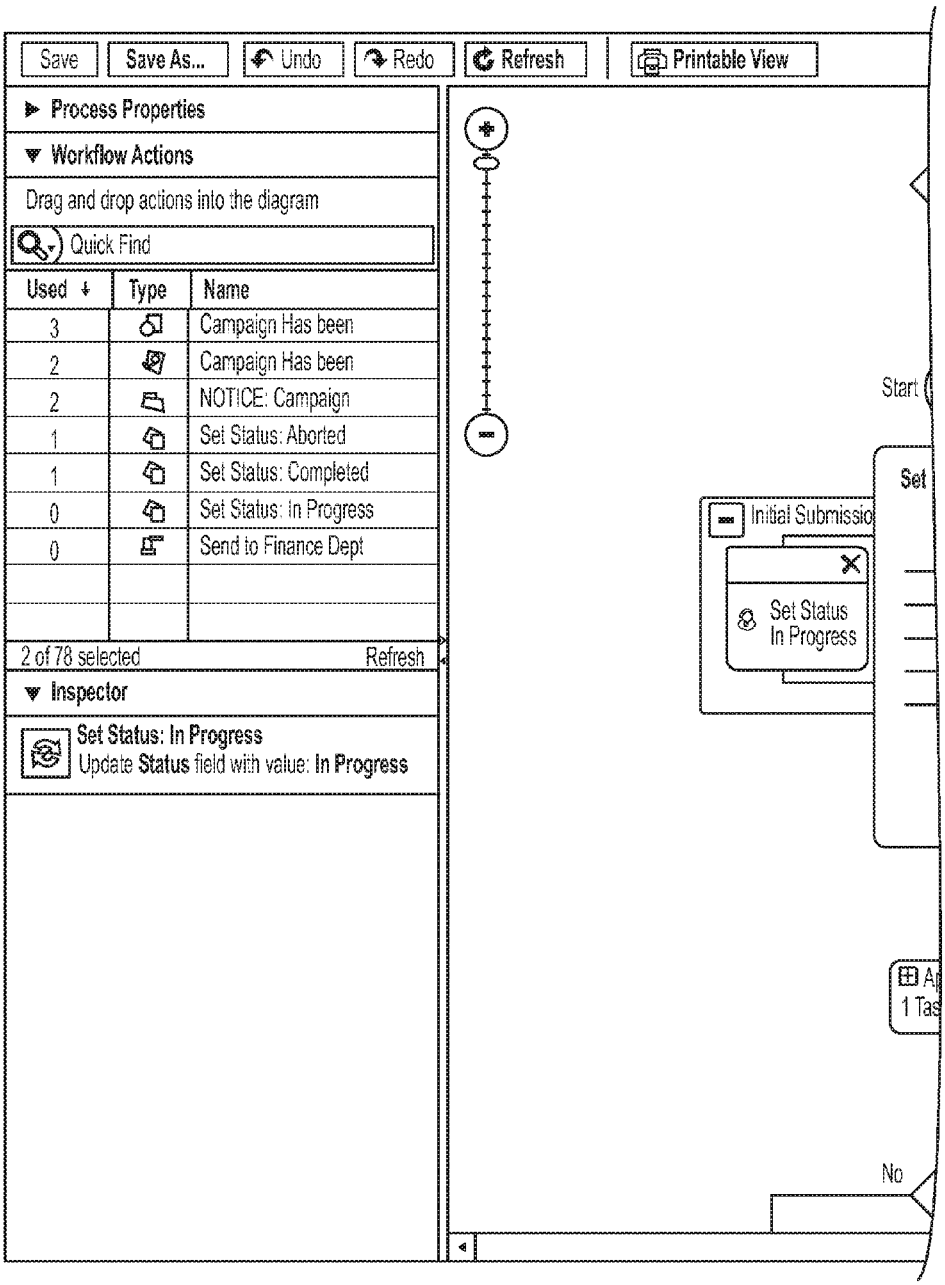

Save
Save As...
Undo
Redo
Refresh
Printable View
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3 Campaign Has been
2 Campaign Has been
2 NOTICE: Campaign
1 Set Status: Aborted
1 Set Status: Completed
0 Set Status: In Progress
0 Send to Finance Dept
2 of 78 selected
Refresh
Inspector
Set Status: In Progress
Update Status field with value: In Progress
Start
Initial Submissio
Set Status In Progress
No

FIG. 13

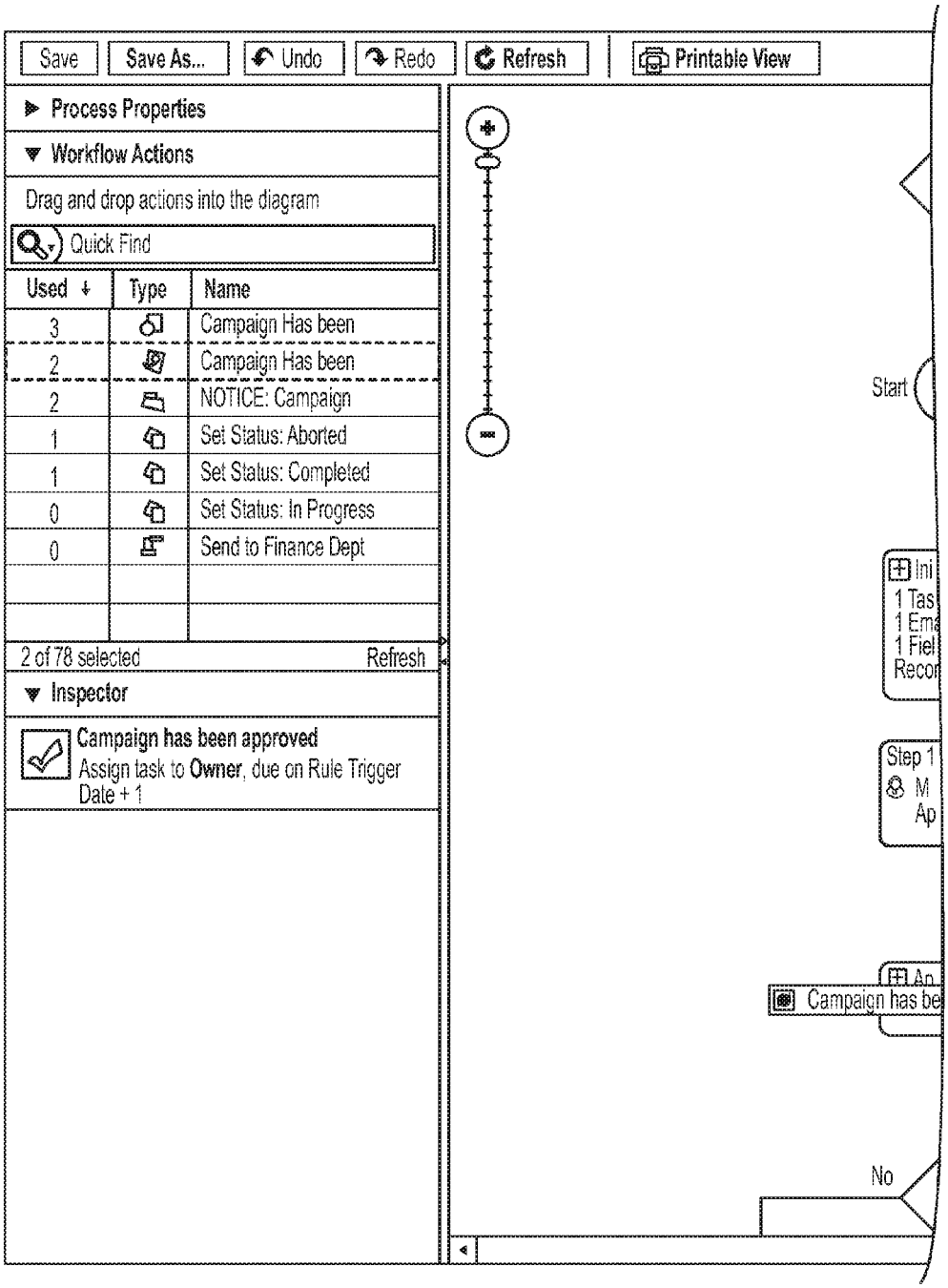

Save
Save As...
Undo
Redo
Refresh
Printable View
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3
Campaign Has been
2
Campaign Has been
2
NOTICE: Campaign
1
Set Status: Aborted
1
Set Status: Completed
0
Set Status: In Progress
0
Send to Finance Dept
2 of 78 selected
Refresh
Inspector
Campaign has been approved
Assign task to Owner, due on Rule Trigger Date + 1
Start
Step 1
Campaign has be
No

FIG. 14A

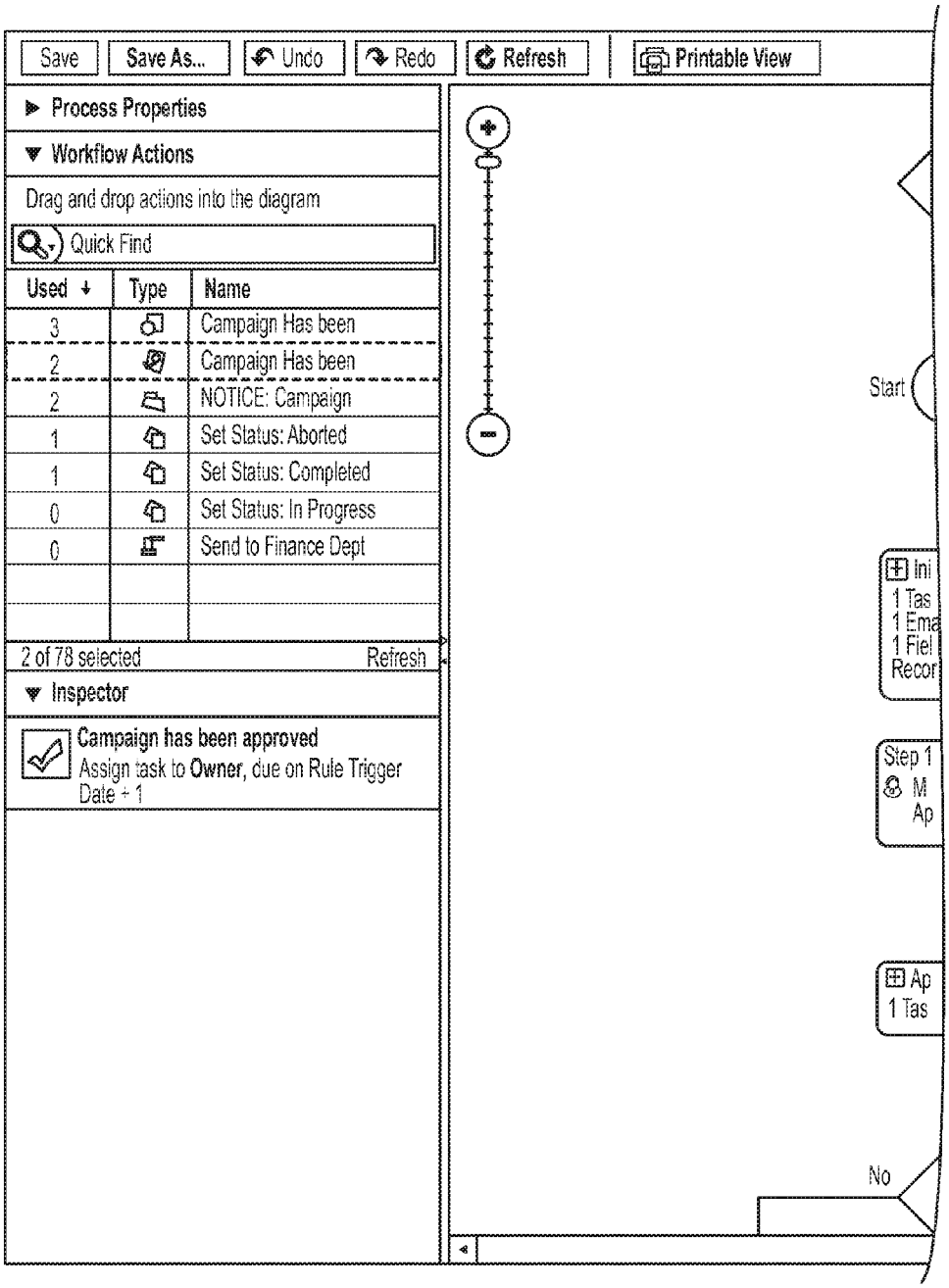

Save
Save As...
Undo
Redo
Refresh
Printable View
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3
Campaign Has been
2
Campaign Has been
2
NOTICE: Campaign
1
Set Status: Aborted
1
Set Status: Completed
0
Set Status: In Progress
0
Send to Finance Dept
2 of 78 selected
Refresh
Inspector
Campaign has been approved
Assign task to Owner, due on Rule Trigger Date + 1
Start
Ini
1 Tas
1 Ema
1 Fiel
Recor
Step 1
M
Ap
Ap
1 Tas
No

FIG. 14B

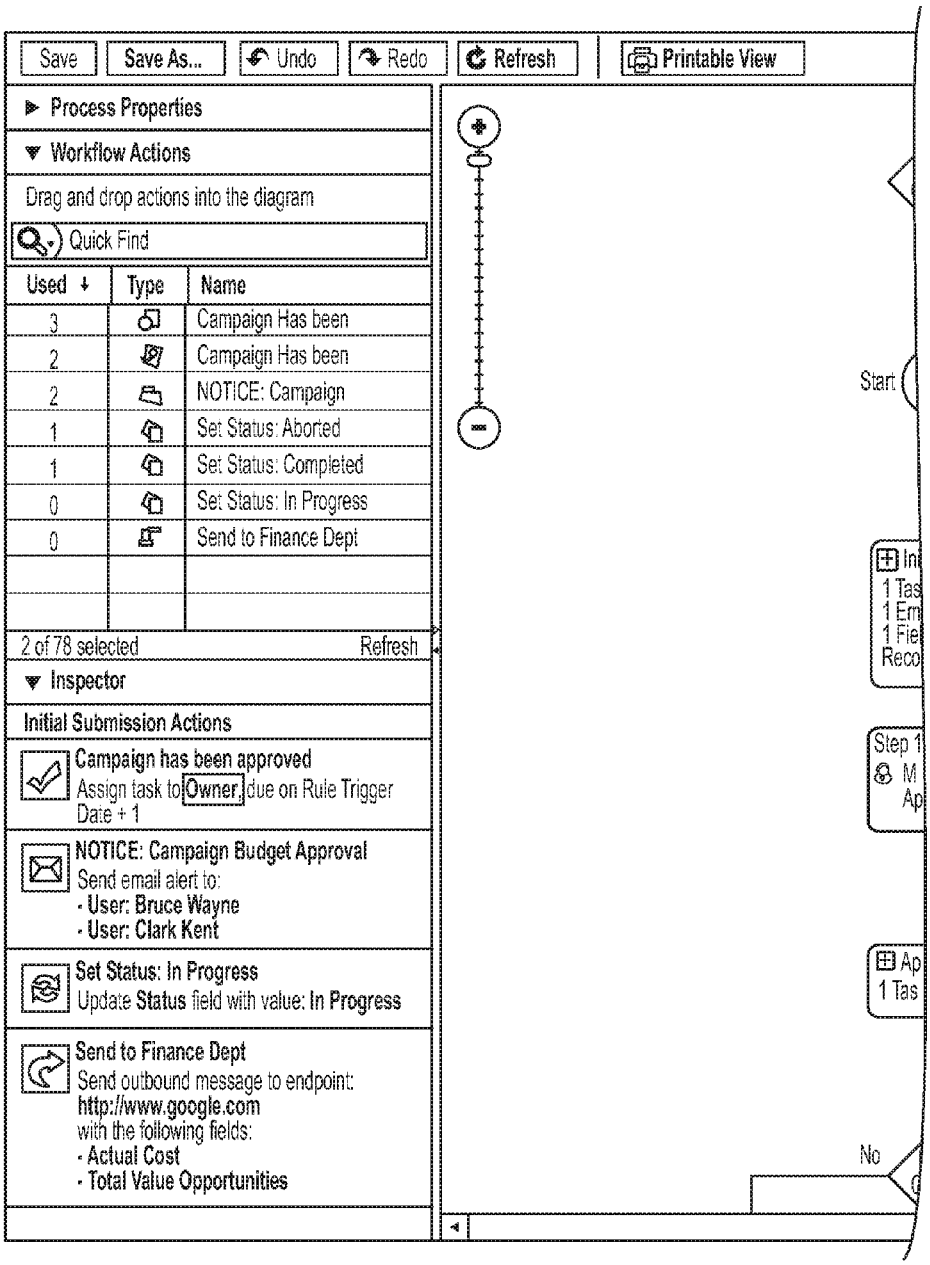

Save
Save As...
Undo
Redo
Refresh
Printable View
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3 Campaign Has been
2 Campaign Has been
2 NOTICE: Campaign
1 Set Status: Aborted
1 Set Status: Completed
0 Set Status: In Progress
0 Send to Finance Dept
2 of 78 selected
Refresh
Inspector
Initial Submission Actions
Campaign has been approved
Assign task to Owner, due on Rule Trigger Date + 1
NOTICE: Campaign Budget Approval
Send email alert to:
- User: Bruce Wayne
- User: Clark Kent
Set Status: In Progress
Update Status field with value: In Progress
Send to Finance Dept
Send outbound message to endpoint:
http://www.google.com
with the following fields:
- Actual Cost
- Total Value Opportunities
Start
No

FIG. 15

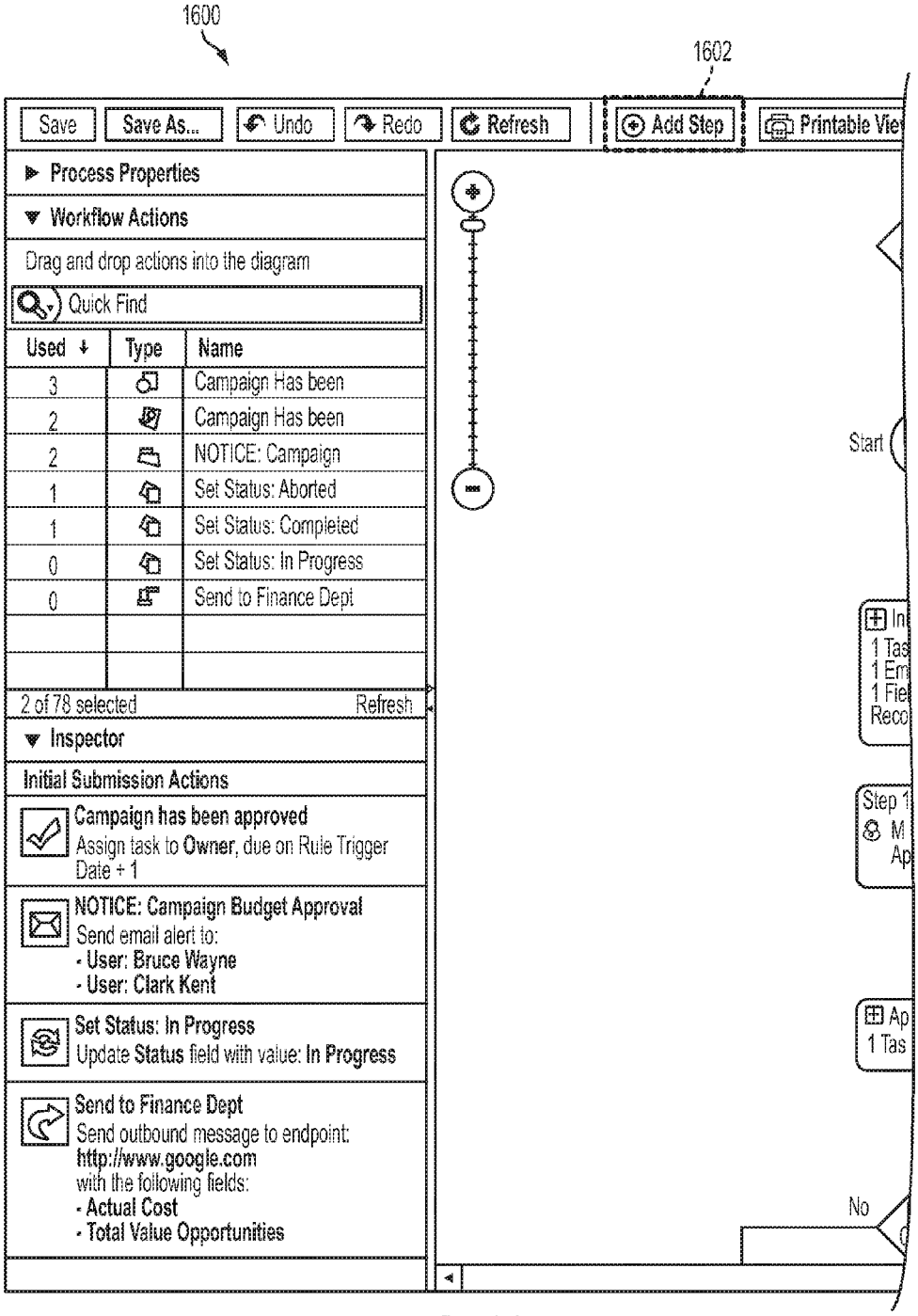

1600
1602
Save
Save As...
Undo
Redo
Refresh
Add Step
Printable Vie
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3 Campaign Has been
2 Campaign Has been
2 NOTICE: Campaign
1 Set Status: Aborted
1 Set Status: Completed
0 Set Status: In Progress
0 Send to Finance Dept
2 of 78 selected
Refresh
Inspector
Initial Submission Actions
Campaign has been approved
Assign task to Owner, due on Rule Trigger Date + 1
NOTICE: Campaign Budget Approval
Send email alert to:
- User: Bruce Wayne
- User: Clark Kent
Set Status: In Progress
Update Status field with value: In Progress
Send to Finance Dept
Send outbound message to endpoint:
http://www.google.com
with the following fields:
- Actual Cost
- Total Value Opportunities
Start
No

FIG. 16

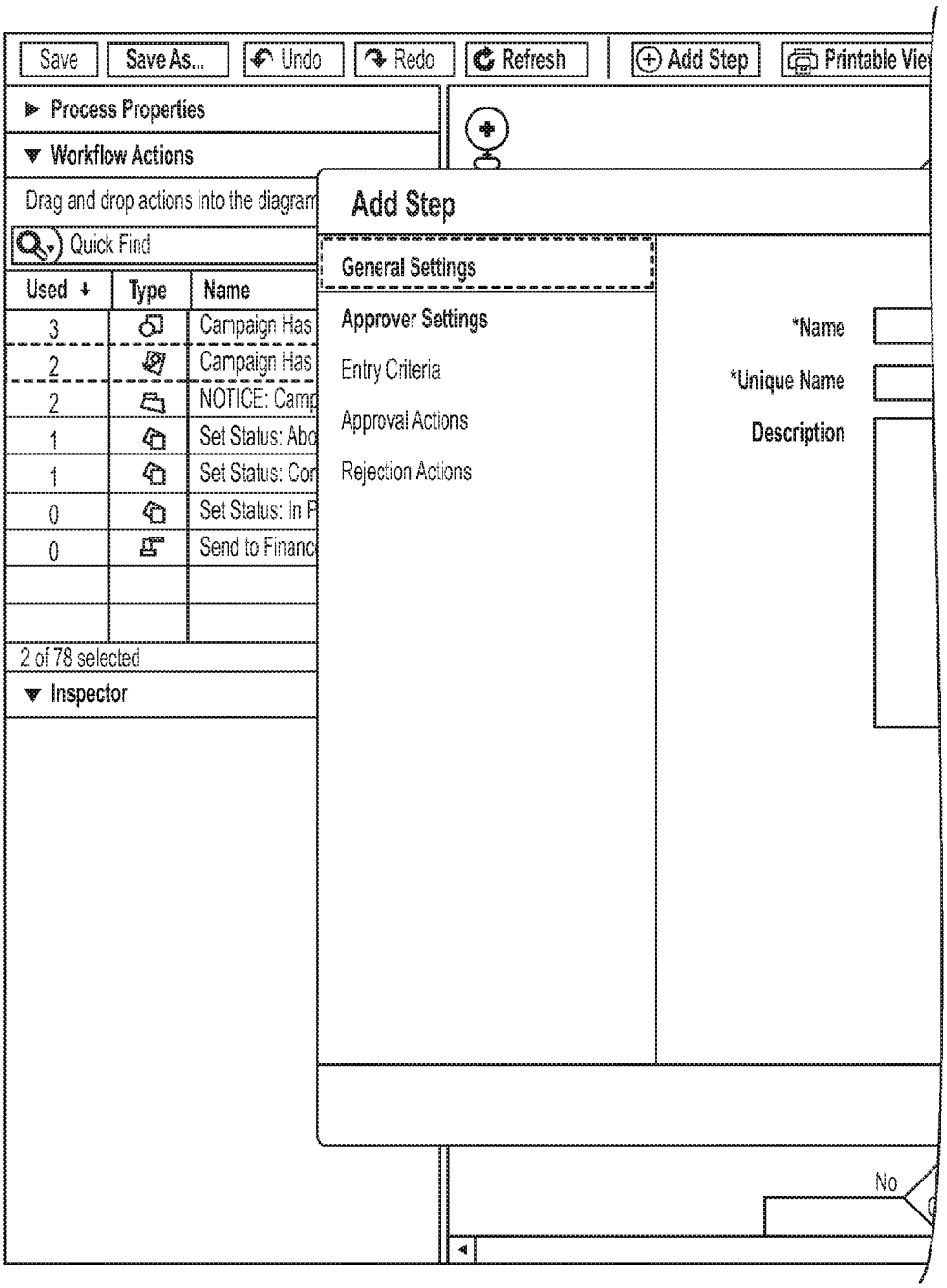

Save
Save As...
Undo
Redo
Refresh
Add Step
Printable Vie
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3
Campaign Has
2
Campaign Has
2
NOTICE: Camp
1
Set Status: Abo
1
Set Status: Cor
0
Set Status: In P
0
Send to Financ
2 of 78 selected
Inspector
Add Step
General Settings
Approver Settings
Entry Criteria
Approval Actions
Rejection Actions
*Name
*Unique Name
Description
No

FIG. 17

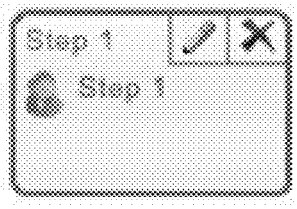


FIGURE 18A

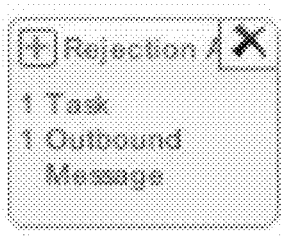


FIGURE 18B

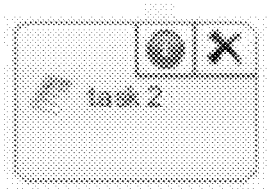


FIGURE 18C

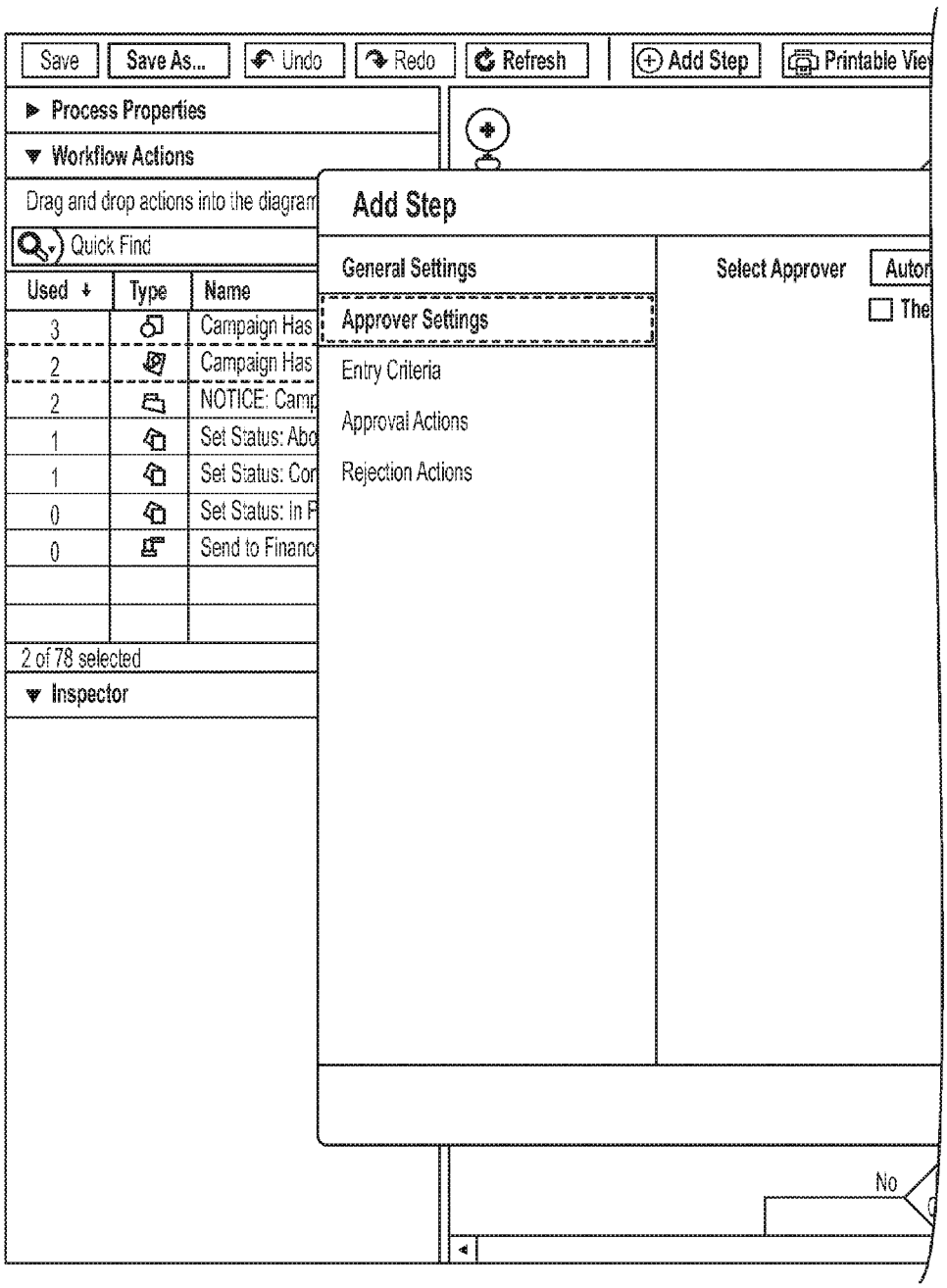

Save
Save As...
Undo
Redo
Refresh
Add Step
Printable Vie
Process Properties
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3
Campaign Has
2
Campaign Has
2
NOTICE: Camp
1
Set Status: Abo
1
Set Status: Cor
0
Set Status: In P
0
Send to Financ
2 of 78 selected
Inspector
Add Step
General Settings
Approver Settings
Entry Criteria
Approval Actions
Rejection Actions
Select Approver
Autor
The
No

FIG. 19

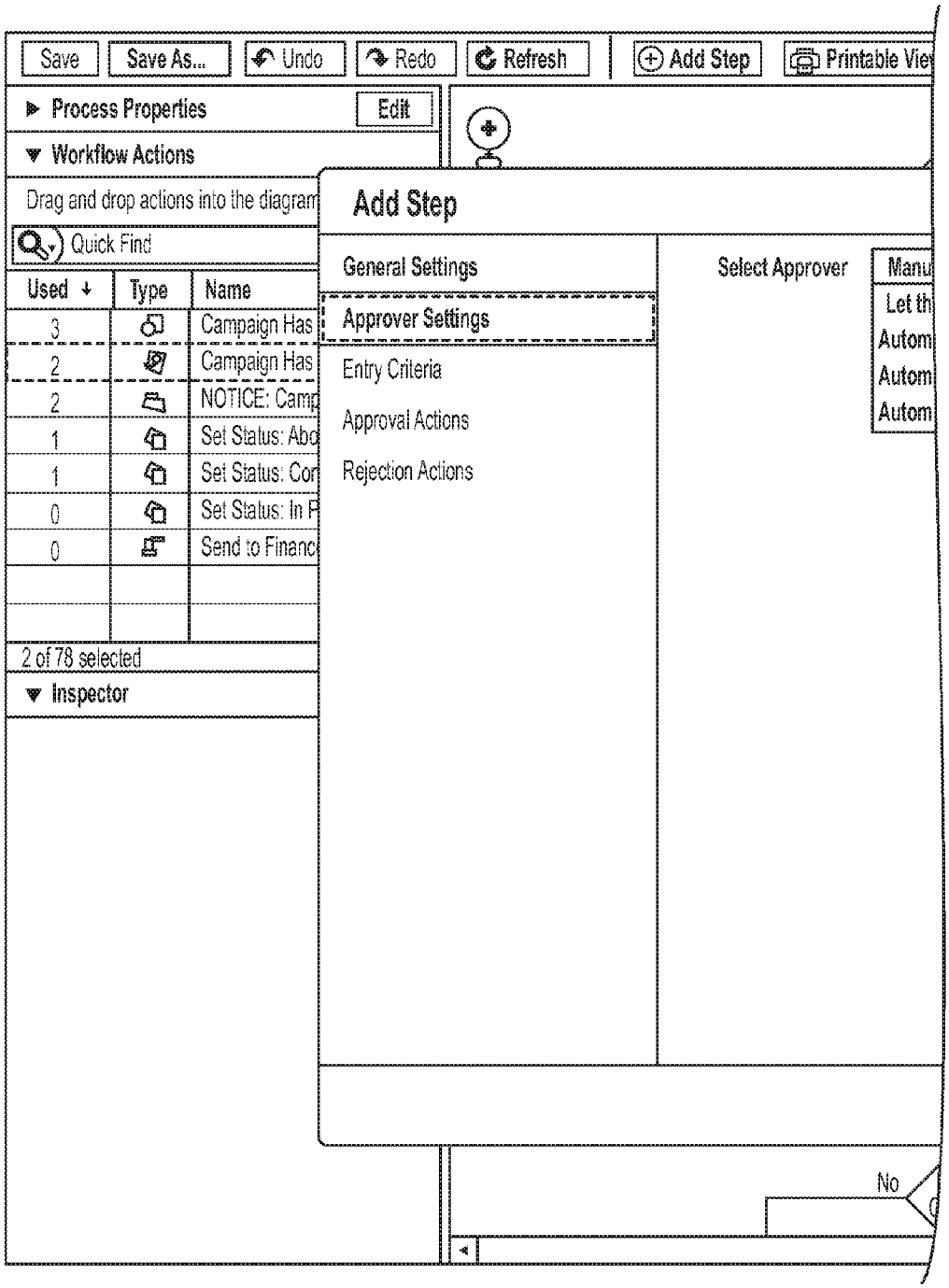

Save
Save As...
Undo
Redo
Refresh
Add Step
Printable Vie
Process Properties
Edit
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3
Campaign Has
2
Campaign Has
2
NOTICE: Camp
1
Set Status: Abo
1
Set Status: Cor
0
Set Status: In P
0
Send to Financ
2 of 78 selected
Inspector
Add Step
General Settings
Approver Settings
Entry Criteria
Approval Actions
Rejection Actions
Select Approver
Manu
Let th
Autom
Autom
Autom
No

FIG. 20

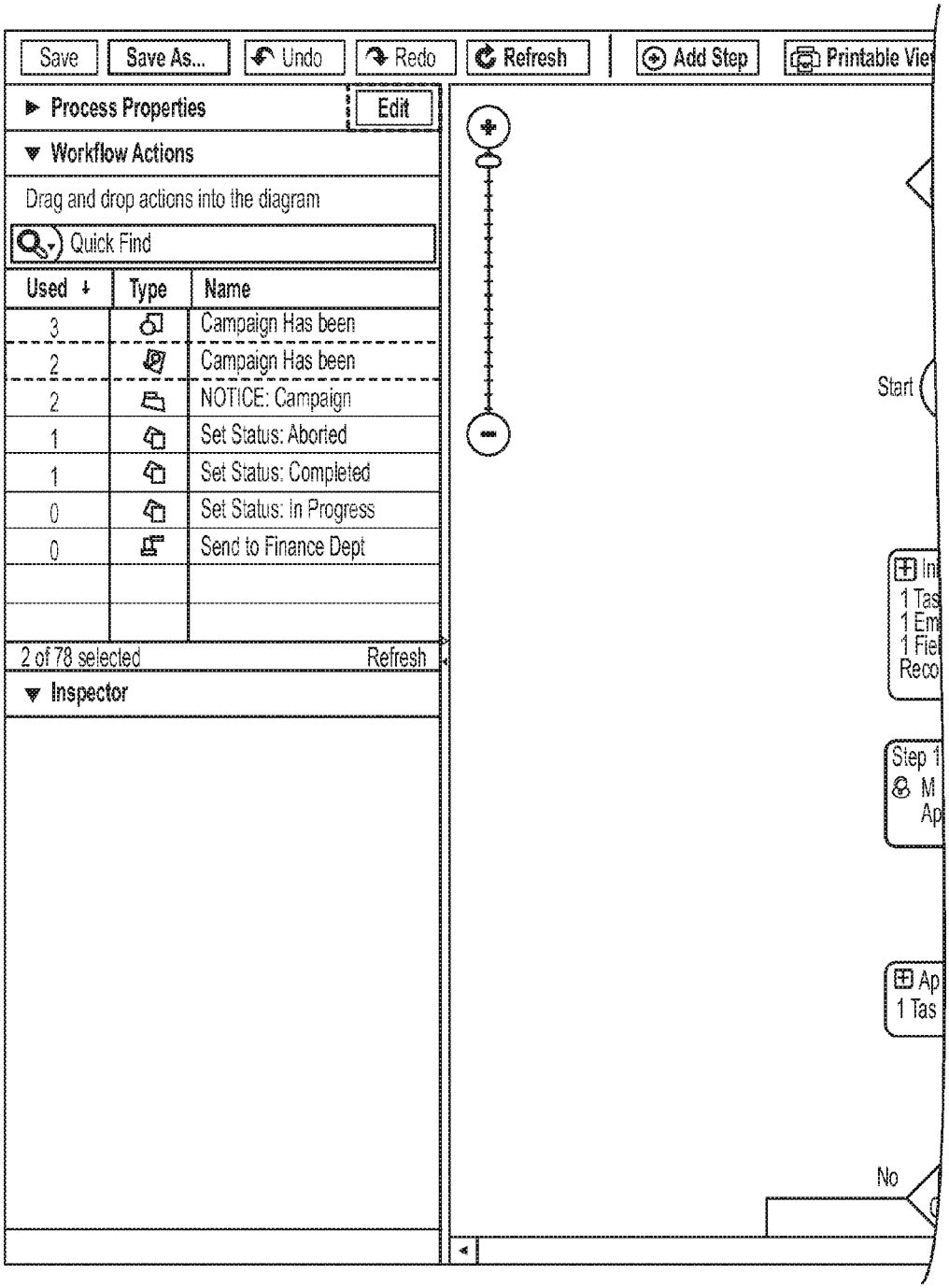

Save
Save As...
Undo
Redo
Refresh
Add Step
Printable Vie
Process Properties
Edit
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3
Campaign Has been
2
Campaign Has been
2
NOTICE: Campaign
1
Set Status: Aborted
1
Set Status: Completed
0
Set Status: In Progress
0
Send to Finance Dept
2 of 78 selected
Refresh
Inspector
Start
No

FIG. 21

Save
Save As...
Undo
Redo
Refresh
Add Step
Printable Vie
Process Properties
Edit
Workflow Actions
Drag and drop actions into the diagram
Quick Find
Used
Type
Name
3
Campaign Has
2
Campaign Has
2
NOTICE: Camp
1
Set Status: Abo
1
Set Status: Cor
0
Set Status: In F
0
Send to Financ
2 of 78 selected
Inspector
Edit Process Properties
General Settings
Entry Criteria
Submission Settings
Approver Settings
*Name
*Unique Name
Description
No

FIG. 22

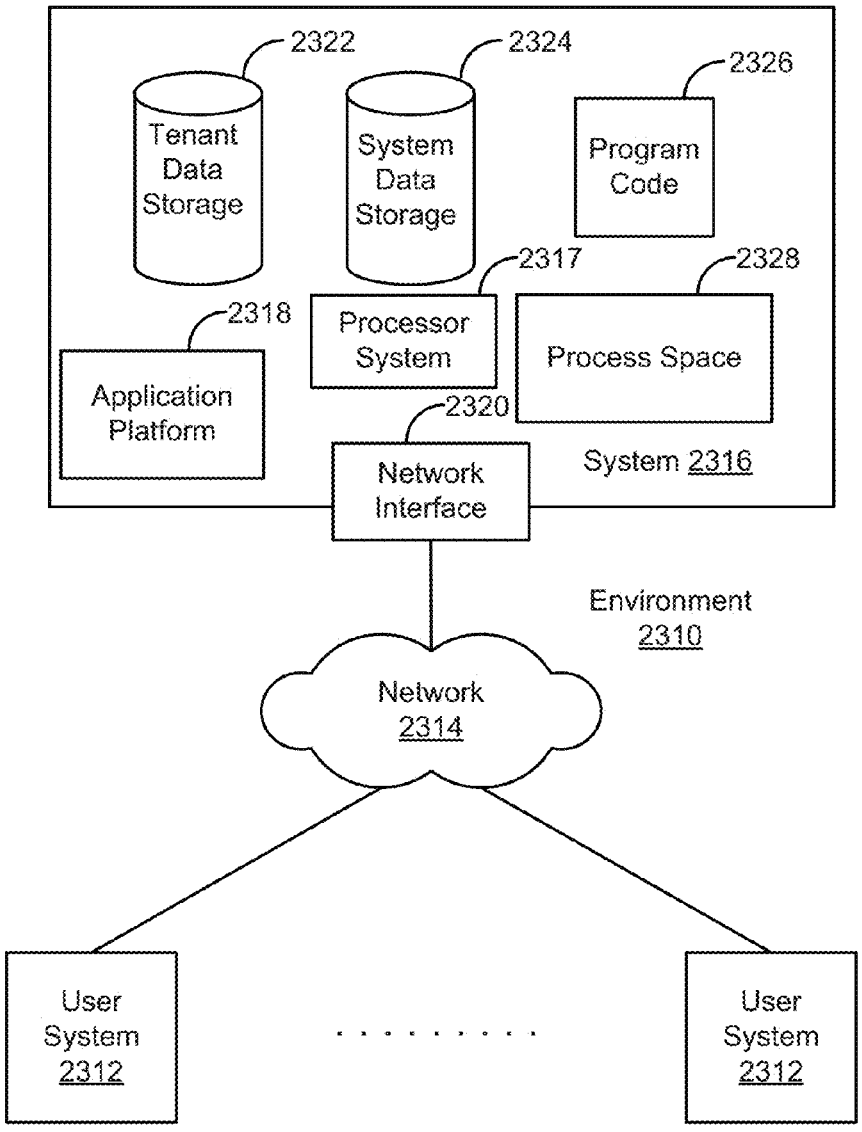

2322
2324
2326
Tenant Data Storage
System Data Storage
Program Code
2317
2328
2318
Processor System
Process Space
Application Platform
2320
Network Interface
System 2316
Environment 2310
Network 2314
User System 2312
User System 2312

FIGURE 23

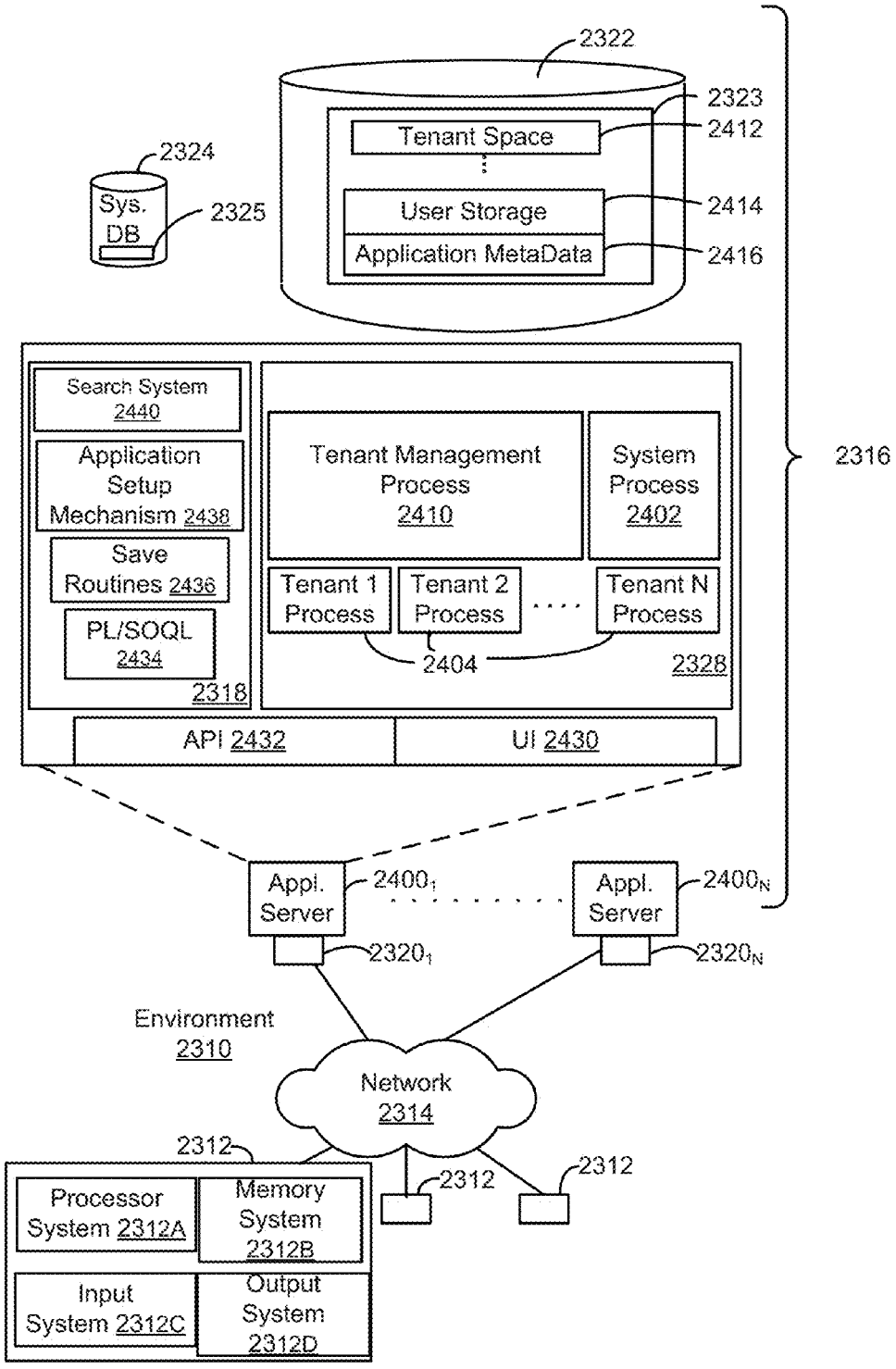

2322
2323
Tenant Space
2412
2324
Sys. DB
2325
User Storage
2414
Application MetaData
2416
Search System 2440
Application Setup Mechanism 2438
Save Routines 2436
PL/SOQL 2434
2318
Tenant Management Process 2410
System Process 2402
Tenant 1 Process
Tenant 2 Process
Tenant N Process
2404
2328
API 2432
UI 2430
2316
Appl. Server
2400$_1$
Appl. Server
2400$_N$
2320$_1$
2320$_N$
Environment 2310
Network 2314
2312
2312
2312
Processor System 2312A
Memory System 2312B
Input System 2312C
Output System 2312D

FIGURE 24

SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR INTERACTING WITH A PROCESS DIAGRAM

COPYRIGHT NOTICE

A portion of the disclosure of this patent document contains material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office patent file or records, but otherwise reserves all copyright rights whatsoever.

FIELD OF THE INVENTION

The current invention relates generally to workflow tools, and more particularly to process diagrams.

BACKGROUND

The subject matter discussed in the background section should not be assumed to be prior art merely as a result of its mention in the background section. Similarly, a problem mentioned in the background section or associated with the subject matter of the background section should not be assumed to have been previously recognized in the prior art. The subject matter in the background section merely represents different approaches, which in and of themselves may also be inventions.

In conventional systems, process diagrams provide a user with useful workflow information. There is often a desire to enhance the experience a user has when interacting with a process diagram. For example, there is often a desire to enhance actions such as navigating the process diagram, searching the process diagram, editing the process diagram, etc. Unfortunately, conventional design and implementation of process diagrams fails to optimize such a user experience.

BRIEF SUMMARY

In accordance with embodiments, there are provided mechanisms and methods for interacting with a process diagram. These mechanisms and methods for interacting with a process diagram may allow for a user's enhanced interactive experience. The ability of embodiments to provide such enhancements may allow for improved navigation, searching, editing, and so forth of the process diagram.

In an embodiment and by way of example, a method is provided for interacting with a process diagram. In use, one or more steps are incorporated into a process diagram. Additionally, one or more states are incorporated into the process diagram, where the one or more steps are associated with the one or more states.

While the present invention is described with reference to an embodiment in which techniques for interacting with a process diagram are implemented in an application server providing a front end for a multi-tenant database on-demand service, the present invention is not limited to multi-tenant databases or deployment on application servers. Embodiments may be practiced using other database architectures, i.e., ORACLE®, DB2® and the like without departing from the scope of the embodiments claimed.

Any of the above embodiments may be used alone or together with one another in any combination. Inventions encompassed within this specification may also include embodiments that are only partially mentioned or alluded to or are not mentioned or alluded to at all in this brief summary or in the abstract. Although various embodiments of the invention may have been motivated by various deficiencies with the prior art, which may be discussed or alluded to in one or more places in the specification, the embodiments of the invention do not necessarily address any of these deficiencies. In other words, different embodiments of the invention may address different deficiencies that may be discussed in the specification. Some embodiments may only partially address some deficiencies or just one deficiency that may be discussed in the specification, and some embodiments may not address any of these deficiencies.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a method for interacting with a process diagram, in accordance with one embodiment.

FIG. **2** shows an exemplary process diagram layout, in accordance with one embodiment.

FIG. **3** shows an exemplary process diagram, in accordance with one embodiment.

FIG. **4** shows an exemplary exception diagram, in accordance with one embodiment.

FIG. **5**A-FIG. **5**E shows an exemplary printable view, in accordance with one embodiment.

FIG. **6** shows an interface including a large process view, in accordance with one embodiment.

FIG. **7** shows an exemplary searchable process diagram interface, in accordance with one embodiment.

FIG. **8** shows another exemplary searchable process diagram interface, in accordance with one embodiment.

FIG. **9** shows yet another exemplary searchable process diagram interface, in accordance with one embodiment.

FIG. **10** shows still another exemplary searchable process diagram interface, in accordance with one embodiment.

FIG. **11** shows an exemplary action being selected in a sidebar of a process diagram interface, in accordance with one embodiment.

FIG. **12** shows an exemplary subprocess being selected in a sidebar of a process diagram interface, in accordance with one embodiment.

FIG. **13** shows an exemplary action being double-clicked in a sidebar or a diagram in a process diagram interface, in accordance with one embodiment.

FIG. **14**A shows an exemplary drag and drop action in a process diagram interface, in accordance with one embodiment.

FIG. **14**B shows another exemplary drag and drop action in a process diagram interface, in accordance with one embodiment.

FIG. **15** shows an exemplary find functionality of a process diagram interface, in accordance with one embodiment.

FIG. **16** shows an exemplary functionality for adding a step in a process diagram interface, in accordance with one embodiment.

FIG. **17** shows an exemplary overlay for adding a step in a process diagram interface, in accordance with one embodiment.

FIG. **18**A shows exemplary hover options existing for a node in a process diagram interface, in accordance with one embodiment.

FIG. **18**B shows exemplary hover options existing for an action group in a process diagram interface, in accordance with one embodiment.

FIG. **18**C shows exemplary hover options existing for an action in a process diagram interface, in accordance with one embodiment.

FIG. **19** shows an exemplary approver settings overlay in a process diagram interface, in accordance with one embodiment.

FIG. **20** shows an exemplary approver settings overlay picklist in a process diagram interface, in accordance with one embodiment.

FIG. **21** shows an exemplary edit button placement in a process diagram interface, in accordance with one embodiment.

FIG. **22** shows an exemplary edit overlay in a process diagram interface, in accordance with one embodiment.

FIG. **23** illustrates a block diagram of an example of an environment wherein an on-demand database service might be used.

FIG. **24** illustrates a block diagram of an embodiment of elements of FIG. **4** and various possible interconnections between these elements.

DETAILED DESCRIPTION

General Overview

Systems and methods are provided for interacting with a process diagram.

There is often a desire to enhance the experience a user has when interacting with a process diagram. For example, there is often a desire to enhance actions such as navigating the process diagram, searching the process diagram, editing the process diagram, etc.

Thus, mechanisms and methods are provided herein for interacting with a process diagram, where these mechanisms and methods for interacting with a process diagram may allow for a user's enhanced interactive experience with the process diagram. The ability of embodiments to provide such enhancements may allow for improved navigation of the process diagram, searching of the process diagram, editing of the process diagram, etc.

Next, mechanisms and methods for interacting with a process diagram will be described with reference to exemplary embodiments.

FIG. **1** shows a method **100** for interacting with a process diagram, in accordance with one embodiment. As shown, one or more steps are incorporated into a process diagram. See operation **102**.

In the context of the present description, the process diagram may include any diagram that illustrates a process. For example, the process may include a workflow, a business operations process, a retail process, a manufacturing process, a hiring process, etc. In one embodiment, the process diagram may illustrate more than one process. Additionally, the steps that are incorporated into the process diagram may include any action capable of being performed during the process. For example, the steps may include performing a procedure, transmitting a communication, sending a notification, creating a document, etc.

Further, in another embodiment, the process diagram may include an image that is displayed and that comprises one or more objects representative of one or more elements within the process. For example, the diagram may include one or more geometric shapes (e.g., squares, circles, triangles, etc.), where each shape represents an element within the process. In another embodiment, the steps incorporated into the process diagram may be represented by a particular object. For example, each step in the process diagram may be represented by a rectangle.

Further still, in another embodiment, an expand control may be displayed on one or more of the steps. For example, a visual indicator may be associated with a step, where selecting the expand control may illustrate one or more additional elements associated with the step. In one embodiment, the additional elements associated with the step may include one or more subprocesses, one or more states, etc.

Also, in yet another embodiment, the steps may be incorporated into the process diagram automatically. For example, the process diagram may be automatically populated with the steps from a database or other source. In another embodiment, the steps may be incorporated into the process diagram manually. For example, a user may manually insert the steps into the process diagram using an interface, including a graphical user interface (GUI), a text interface, or any other interface by which a user can view, edit, search, navigate, and/or otherwise interact with the process diagram.

In addition, one or more states are incorporated into the process diagram, where the one or more steps are associated with the one or more states, as shown in operation **104**. In one embodiment, the states may include a start state. For example, the states may include a visual representation for the start of the process in the process diagram. In another embodiment, the states may include one or more end states. For example, the states may include one or more visual representations for one or more possible endings of the process in the process diagram. Further, the states may be incorporated into the process diagram automatically and/or manually, as described hereinabove.

Further still, in one embodiment, the states may include an end result of one or more of the steps in the process diagram. In another embodiment, the states may include a start of one or more of the steps in the process diagram. Of course, the one or more steps may be associated with the one or more states in any manner.

Additionally, in one embodiment, the association between the one or more steps and the one or more states may be previously determined. Further, the incorporation of the one or more states may be based at least in part on the association between the one or more steps and the one or more states.

In yet another embodiment, one or more connections may exist between one or more steps and/or one or more states. For example, the performance of one step may lead to the performance of another step, and as a result, a connection may exist between the two steps. In another embodiment, the performance of one step may lead to an arrival at a particular state. In still another embodiment, a state may proceed with the performance of a particular step. As a result, a connection may exist between the associated state and step. In another embodiment, such a connection may be displayed by the use of a line, arrow, or other visual connector between the steps and/or the steps and states.

Additionally, in another embodiment, one or more criteria may be incorporated into the process diagram. In one embodiment, the criteria may include one or more conditional elements. In another example, the criteria may lead to different elements within the process diagram based on whether the criteria are met. For example, the criteria may include one or more actions that may have to be performed. If the actions are performed, the criteria may connect to a particular element of the process diagram. However, if one or more of the actions are not performed, the criteria may connect to a different element of the process diagram. In another embodiment, the criteria may be expressed as a formula.

Further, in another embodiment, one or more entities may be incorporated into the process diagram. In one embodiment, the entities may include a person, position, division, etc. associated with one or more elements of the process diagram. For example, the entities may include a manager, a customer, a name of a person, a sales division, a delegate, etc.

In another embodiment, the entity may be associated with an approval action within the process diagram. For example, the entity may be in charge of one or more approval elements within the process diagram, and the entity may lead to different elements within the process diagram based on whether the one or more approval elements are met. In another example, the entities may include one or more approver nodes.

Also, in one embodiment, one or more elements may be included (e.g. in an interface, etc.) for interacting with the process diagram. For example, a sidebar may be incorporated into an interface associated with the process diagram (e.g. an interface that is used to view the process diagram, edit the process diagram, etc.). In one embodiment, the sidebar may appear when one or more elements of the process diagram are selected by a user. In another embodiment, the sidebar may always appear with the process diagram. In yet another embodiment, the sidebar may be located on the top, bottom, left side, right side, or any other location of the interface associated with the process diagram. Additionally, in one embodiment, the sidebar may be used to incorporate one or more additional elements into the process diagram. For example, a user may select one or more elements from the sidebar and drag them onto the process diagram in order to incorporate them into the process diagram.

In another embodiment, the sidebar may be used to provide more information about one or more elements of the process diagram. For example, a user may hover over or select an element in the process diagram, and more information regarding that element may appear on the sidebar. In this way, the sidebar may assist in the interaction between a user and the process diagram, and may provide more details information about elements within the process diagram.

In yet another embodiment, a navigator component may be incorporated into the interface associated with the process diagram. For example, the navigator component may be included in the sidebar of the process diagram. In one embodiment, the navigator component may illustrate one or more elements of the process diagram. For example, the overall process diagram (e.g., an entirety of a process diagram, etc.) may be illustrated in the navigator component. Additionally, a user may interact with the navigator component in order to navigate through the process diagram. For example, the user may move a window located in the navigator component in order to move to a particular area in the process diagram encompassed by the window. In this way, a user may easily navigate the process diagram, and an overview of the process diagram may be clearly displayed.

Additionally, in one embodiment, a zoom capability may be incorporated into the interface associated with the process diagram. For example, the zoom capability may include the ability for a user to zoom in or out of the process diagram. For example, a zoom slider may be used to zoom in and/or out of the process diagram. In another embodiment, the process diagram may adjust to a location of the user. For example, the process diagram may be automatically centered after a user zooms in or out of the process diagram. Further, the navigator component may react to a zooming operation. For example, the window in the navigator component may enlarge to scale as a user zooms in to the process diagram, and the window may shrink to scale as the user zooms out of the process diagram. In this way, a user may easily move in and out of the process diagram.

Further, in one embodiment, a search component may be incorporated into the interface associated with the process diagram. For example, a user may input one or more characters into the search component, and the search component may search for the one or more characters input by the user within the process diagram. In another embodiment, the search component may enable the user to filter their search. In yet another embodiment, elements within the process diagram that match input search characters may be highlighted in the process diagram. For example, the process diagram may be grayed out except for the one or more elements that match the input search characters.

Further still, in another embodiment, one or more portions of the sidebar that match input search characters may be highlighted. In yet another embodiment, if an element of the process diagram contains one or more subprocesses, only the subprocesses that match input search characters may be highlighted. Further, in one embodiment, a user may view all elements that match input search characters, or may jump from one element that matches input search characters to another element that matches input search characters. Further still, in another embodiment, a window may automatically scroll to the next element if the next element is not currently visible. In this way, a user may easily search for one or more characters within the process diagram and the results of such search may be easily navigated.

Process Diagram Layout

FIG. **2** shows an exemplary process diagram layout **200**, in accordance with one embodiment. As an option, the process diagram layout **200** may be implemented in the context of the functionality of FIG. **1**. Of course, the process diagram layout **200** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description.

As shown, the process diagram layout **200** includes a start state **206** and end states **208**A-C. Additionally, the process diagram layout **200** includes elements **202**A-D which can expand vertically to show additional features of the process diagram layout **200**. Additionally, the process diagram layout **200** includes elements **204**A-D which expand horizontally to show additional features of the process diagram layout **200**. In one embodiment, if one or more of the elements of the process diagram layout **200** overlap upon expansion, the most recent element may be rendered on top of the element with which it overlaps. For example, if element **202**C overlaps with element **204**B when both are expanded, and element **202**C was the most recently accessed element, then element **202**C will be rendered on top of element **204**B. Also, in one embodiment, the process diagram layout **200** may be substantially linear.

In addition, one or more virtual columns **212**A-D are included in the process diagram layout **200**. Such virtual columns **212**A-D may assist with the placement of one or more elements within the process diagram layout **200**.

Visual Design

FIG. **3** shows an exemplary process diagram **300**, in accordance with one embodiment. As an option, the process diagram **300** may be implemented in the context of the functionality of FIGS. **1** and/or **2**. Of course, the process diagram **300** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description.

Criteria Rendering

As shown, the process diagram **300** includes filter criteria **302**. The process diagram **300** includes a number of elements found in the filter criteria **302** inside a diamond representing the filter criteria **302**. In one embodiment, a number representing the number of elements within the filter criteria **302** may be included within the diamond representing the filter criteria **302**. As shown, the text "3 Criteria" within the diamond representing the criteria **302** illustrates that three separate elements are found within the filter criteria **302**. In this

way, a summary of the elements within the criteria **302** may be shown within the diamond instead of a listing of each element.

In another embodiment, a side bar may show each criteria in its own line appended with an "AND" unless advanced filter options are used, in which case all criteria may appear on one line. One exemplary embodiment of filter criteria is illustrated in Table 1. It should be noted that the embodiment presented in Table 1 is set forth for illustrative purposes only, and thus should not be construed as limiting in any manner.

TABLE 1

(Campaign: Budgeted Cost greater than 10) and (Campaign: Actual Cost greater than 1221) and (Campaign: Campaign Name not equal to null) and (Campaign: Status equals In Progress, Planned)

Additionally, the process diagram **300** includes formula criteria **304**. The diamond representing the formula criteria **304** indicates that such criteria are formula criteria by the term "Formula" within the diamond. In one embodiment, the side bar may show the criteria in full, with text wrapped within the width of the side bar. One exemplary embodiment of formula criteria is illustrated in Table 2. It should be noted that the embodiment presented in Table 2 is set forth for illustrative purposes only, and thus should not be construed as limiting in any manner.

TABLE 2

(BudgetedCost > 10000 || ActualCost < 1000) && NOT(ISNULL(Name))

Header Bar

In one embodiment, the process diagram **300** may include a fixed header bar. For example, the process diagram **300** may include a fixed header bar with an Approval Process name on the left, and a "Help for this Page" link on the right that opens a new Help window.

Line Drawing

In one embodiment, one or more key rules may be established that need to be followed when lines are drawn between elements of the process diagram **300**. For example, the process diagram **300** may support lines between 2 steps of the process diagram **300**. In one embodiment, when there are no criteria associated with a transition, the line may be a straight arrow connecting the element vertically centered.

Additionally, in another embodiment, the process diagram **300** may support lines between a step in the process diagram **300** and a decision element of a next step in the diagram **300**. The line should be vertically centered. In yet another embodiment, a "True"/"Yes" transition out of the decision element in the process diagram **300** may always be connected with a step element vertically centered. For example, the "Yes" transition **306** is vertically centered with respect to the process diagram **300**.

Further, in one embodiment, a line from a "False"/"No" transition may go left and down the process diagram **300**. For example, the "No" transition **308** is situated to the left of the process diagram **300** and goes down the process diagram **300**. In another embodiment, if there are no more steps or there is no SKIP step configured, the "False"/"No" transition may connect to a Final Approval actions element at the bottom of the diagram. For example, in the process diagram **300**, the "No" transition **308** has no more steps and no SKIP step configured, and therefore connects, to the Final Approval actions section **310**.

In another embodiment, if a step in the process diagram **300** is marked "Skippable," and the next step has a criteria associated with it, a line may connect to the left corner of the Decision element of the next step. Further, in still another embodiment, if the step is marked "Skippable," and the next step has NO criteria associated with it, a line may connect to the left corner of the Step element.

Further still, in yet another embodiment, the process diagram **300** may include just one set of Final rejection actions and one End Rejected state element. It may be right of the main flow of the process diagram **300** and may be centered vertically. In another embodiment, the placement may be along a virtual column. For example, in the process diagram **300**, the final rejection actions **312** and the end rejection state **314** are located right of the main process flow of the process diagram **300** and are centered vertically.

Also, in still another embodiment, the reject transition may always be oriented horizontally. For example, since a reject transition is possible from every step and the reject actions is common across all steps, only one process reject node and one final rejection action node may exist on the process diagram **300** and multiple lines may exist from nodes to the final rejection action node. Additionally, in one embodiment, the process diagram **300** may support lines for the following reject transitions: "Reject—Go Back to step" and "Reject—'Go Back' node."

In addition, in one embodiment, a line going back to a step in the process diagram **300** may start right and go vertically up and connect to the bottom right edge of a previous step. In another embodiment, rejection lines to the Final rejection action may start horizontally to the right and connect to either the center top edge or center bottom edge of the Final rejection actions element. If the line starts above the Final rejection action box, the vertical line may connect to the top edge. If the line starts below, it may connect to the bottom edge.

Further, in another embodiment, the process diagram **300** may have one final approval actions section at the bottom of the process diagram **300**. For example, the process diagram **300** includes a single Final Approval actions section **310** at the bottom of the process diagram **300**. Still yet, in another embodiment, when a node has multiple lines transitioning into it, they may be merged into one line.

Further still, step actions may be embedded along transition lines in the process diagram **300**. For example; there may never be an arrow before entering a step action. Additionally, when connecting to the Final Rejection actions element, the rejection actions with that step (if any) may be drawn along a imaginary column between the main process flow and the imaginary column associated with the Final Rejection Actions. Further, when connecting to another step, the Step Approval actions Element may be at the center of the transition line between the steps. Further still, when connecting a Decision element, the Step Approval actions Element may be at the center of the transition line between the step and the Decision element.

Actions

In another embodiment, elements indicating "Initial Submission Actions," "Final Rejection Actions" and "Final Approval Actions" may always be labeled, even if they only have 1 action. Further, the process diagram **300** may show the action as-is on a transition line if that is the only action. Further still, if there are multiple actions, then they may be visualized as a sub-process. In another embodiment, a height of the sub-process node depends on how many action types are in it. In one embodiment, the maximum may be to have 5 lines (one line for email alert, task, field update, outbound message, and record lock). In another embodiment, sub-pro-

cesses may always be labeled, e.g. "Step 2 Approval Actions" or "Step 2 Rejection Actions."

Subprocess—Collapse and Expansion

In one embodiment, lines going into a subprocess may never have an arrow, because actions may be performed on the transition and may not be an end state. In another embodiment, clicking a subprocess may expands it. For example, a "+" button may expand the subprocess and may be the same height as the label.

Additionally, in another embodiment, if there are 2 or more actions in a sub-process, the line going into the sub-process may always be aligned with the 2nd action. In yet another embodiment, the label for the sub-process (e.g. "Final Submission Actions," etc.) may always be made completely visible. Further, when a Recall Subprocess is opened, a line needs to go into the FIRST node so that the minimize button and label can be viewed.

Further still, when the subprocess for initial submission, final approval and step approval actions are expanded, the list of actions may be expanded horizontally. When the subprocess for step rejection and final rejection actions are expanded, the list of actions may be expanded vertically. When the diagrams are expanded and collapsed, the shapes may not overlap. The most recently opened subprocess may be on top.

Approvers

In one embodiment, approver nodes may be labeled with "Step X" in the top left-hand corner and may have the step name inside the node. In another embodiment, the sidebar may be titled with "Step X: Step Name," e.g. (Step 1: VP of Finance, VP of Tech). Additionally, one exemplary embodiment of additional text that may be shown in the sidebar is illustrated in Table 3. It should be noted that the embodiment presented in Table 3 is set forth for illustrative purposes only, and thus should not be construed as limiting in any manner.

TABLE 3

Submitter can choose approver
Automatically assigned to Manager field
Unanimous approval required from: <APPROVER 1>, <APPROVER 2>, <APPROVER N>
Approval based on FIRST response from: <APPROVER 1>, <APPROVER 2>, <APPROVER N>, Related User: Campaign Owner
The approver's delegate may also approve this request. (this may be in its own block if true)

Aligning

In one embodiment, as the flow of control across multiple steps is displayed vertically, the primary flow may be center aligned. Additionally, the final rejection actions and the End Rejection with the transitions between them may be center horizontally aligned.

Labels

In one embodiment, static labels such as Start, End Recall, End Rejection, End Approval, Approved, Rejected, Yes, No may be rendered appropriately. In another embodiment, Labels should be dynamically rendered appropriately for the following shapes: Decisions, Human activity, Actions, and Subprocesses. Further, the Label for the Sub process diagram element associated with a step approval may be "<Step Name> Approval Actions" and "<Step Name> Rejection Actions" for step rejection Sub Process diagram element. Also, all labels may be appended with " . . . " if they do not fit into a node or box.

Scrolling

In one embodiment, the process diagram **300** may have a fixed width without any expanded sub process along the horizontal axis. Additionally, the process diagram **300** may have a fixed width with an expanded sub process along the horizontal axis. Further, if the process diagram **300** exceeds the right boundary of the window than there should be a horizontal scrollbar. Further still, the process diagram **300** may have a variable size along the vertical axis.

Legend

In one embodiment, the process diagram **300** may include a legend. For example, a legend may be displayed on the process diagram **300** (e.g., a side, top, bottom, etc.) that includes all shapes used in the process diagram **300**.

Sidebar

In one embodiment, a sidebar may be included in the process diagram **300**. For example, the sidebar may appear when a user selects or hovers over an element in the process diagram **300**. In another embodiment, the sidebar may consist of two or more panels. A top panel may have a checkbox to turn off a legend and Approval Process Properties, which may be collapsible. A bottom panel may show details of a node of the process diagram **300** when you hover over the node. In another embodiment, default text in the bottom panel may say "Hover over an item to see its details." In yet another embodiment, details may stay in the sidebar until you hover over something else in the process diagram **300**. Also, highlighted nodes may also stay highlighted until you hover over something else.

In another embodiment, the sidebar may include one or more options associated with field updates, email alerts, tasks, and outbound messages. For example, one exemplary embodiment of options that may be available in the sidebar is illustrated in Table 4. It should be noted that the embodiment presented in Table 4 is set forth for illustrative purposes only, and thus should not be construed as limiting in any manner.

TABLE 4

FIELD UPDATES
Update <FIELD NAME> with lookup value: <LOOKUP VALUE>
Update <FIELD NAME> with value: <VALUE>
Update <FIELD NAME> with formula: <FORMULA>
EMAIL ALERTS
Send <EMAIL TEMPLATE> email to <RECIPIENT 1>, <RECIPIENT 2>, <RECIPIENT N>
TASKS
Assign task to <ASSIGNEE> with due date: <DUE DATE>
OUTBOUND MESSASGES
Send the fields <FIELD 1>, <FIELD 2>, <FIELD N> to endpoint: <ENDPOINT>

Exception Diagrams

FIG. **4** shows an exemplary exception diagram **400**, in accordance with one embodiment. As an option, the exception diagram **400** may be implemented in the context of the functionality of FIGS. **1-3**. Of course, however, the exception

diagram **400** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description.

In one embodiment, an engine running a process diagram may provide certain features where the visual representation is not feasible because the flow is determined only at runtime. For example, when an approve element of the process diagram rejects a request, the current editor may support the ability to "Go Back" to the previous step. For example, the "Go Back A Step" option **402** in exception diagram **400** supports the ability to go back to a previous step in the exception diagram **400**.

Additionally, the skip feature may make the previous step non-deterministic at design-time. So, if such a condition is detected, a special node called "Go Back" may be shown to the user. For example, by hovering over the "Go Back" icon it may highlight all possible steps that it can go back to. Additionally, a verbal explanation may also be provided in the sidebar. For example, by hovering over the "Go Back A Step" option **402** in exception diagram **400**, all possible steps **404** and **406** that can be gone back to are highlighted. In this way, all possibilities to go back in the process diagram may be dynamically shown if more than one possibility exists.

Additionally, the engine may have a safe guard against approving records which enter the process, but do not send an approval request because of the skip feature. For example, if such a condition is detected, a special note at the bottom of the process acting as a "disclaimer" may be shown to the user.

Printing

FIG. **5**A-FIG. **5**E shows an exemplary printable view **500**, in accordance with one embodiment. As an option, the printable view **500** may be implemented in the context of the functionality of FIGS. **1-4**. Of course, however, the printable view **500** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description.

In one embodiment, a user may select to view a process diagram as the printable view **500**. For example, a user may click 'Printable View' while viewing the process diagram, and the window may reload with the printable view **500**. The main content area switches to a non-interactive annotated diagram **502** followed by a table **504** that contains all relevant information. In this way, a user may switch from a view mode to a print mode to print the process diagram.

In one embodiment, gradient may be removed from nodes, which may be given a white background. Additionally, a legend **506** is displayed on the printable view **500**. In one embodiment, the legend **506** may be displayed on first page of the printable view **500** only. Further, in one embodiment, all subprocesses may be collapsed and all "+" buttons may be removed on the printable view **500**.

Also, in one embodiment, a button bar at the bottom or top of the process diagram may stay in place but the buttons may change. For example, a 'Print' button **508** appears on the printable view **500** that may open a Print dialogue when selected. Additionally, a 'Printable View' button changes to an 'Exit Printable View' button **510**, which may toggle back to a standard view when selected. Further, in one embodiment, page breaks may be illustrated in the printable view **500**.

Further still, in one embodiment, all pages in the printable view **500** may have a header with the title of the approval process and last modified info (e.g., "Last Modified by David Park on Apr. 23, 2009 3:01 PM," etc.). Also, in another embodiment, a width of the printable view **500** may be fixed and fit on the page, since the height may be variable the diagram may run across multiple pages. Additionally, if the process diagram spans multiple pages in the printable view **500**, a node may never be split across 2 pages. For example, the bottom of page 1 of the printable view **500** may be an outgoing line and the top of page 2 of the printable view **500** may be an incoming line, etc.

Furthermore, in one embodiment, the table of data **504** may be on its own page. For example, the diagram and part of the table may never be on one page. In addition, a table for the Approval Properties may be provided, as well as a table for the Annotations. In one embodiment, the Annotations table may reflect the hover details in the sidebar. In another embodiment, Flex's standard table component may be used for accessibility purposes.

As also shown, the ordering of the annotated numbers reflects the ordering in the annotated diagram **502**. For example, Entry Criteria **512** is ordered first (e.g., as #1); Initial Submission Actions **514** is ordered second (e.g., as #2). In one embodiment, if Entry Criteria **512** is absent in the annotated diagram **502**; Initial Submission Actions **514** is ordered first. Additionally, any Approval Steps are numbered. For example, Step 1 Criteria may be numbered #2a, Approval Step may be numbered #2b, Approval Actions may be numbered #2c, Rejection Actions may be numbered #2d, Go Back may be numbered #2e. In another embodiment, all nodes associated with 1 step may have the same number but may be sub-annotated with letters.

Further, Final Approval Actions **516** are then numbered, then Final Rejection Actions **518**, and then Final Recall Actions **520**. In one embodiment, the annotated number may be circled and may go to the top left of all nodes (e.g., criteria, step approver, rejection action, approval action, key actions, go back nodes, etc.). In another embodiment, the Start, End Recall, End Reject, End Approval nodes may not be annotated. As such, all elements of the process diagram may be numbered, and footnotes in the table **504** may explain all such elements and all their steps in comprehensive detail using text.

In this way, the process diagram may be transferred into a pure documentation aspect to be used as a document that may be physically examined. For example, the process diagram may be saved as any sort of document (e.g. portable document format (PDF), etc.). Additionally, a full summary of the process diagram may be created.

Large Process Navigation

FIG. **6** shows an interface including a large process view **600**, in accordance with one embodiment. As an option, the interface **600** may be implemented in the context of the functionality of FIGS. **1-5**. Of course, however, the interface **600** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description.

As shown, the interface **600** includes a navigator component **602**. In one embodiment, the navigator component **602** may be a collapsible panel in the sidebar. In another embodiment, the navigator component **602** may have a fixed height. This may prevent the navigator component **602** from taking up the whole sidebar.

Additionally, the entire process is visible in the navigator component **602**. Further, the visible portion of the main diagram **604** is represented in the navigator component **602** as a rectangular frame **606**. In one embodiment, the frame **606** may be dragged up and down by a user to see different parts of the diagram. In another embodiment, the diagram in the navigator component **602** and the main diagram **604** may be 1:1. For example, if a sub-process is opened in the main diagram **604** the same sub-process may be opened in the navigator component **602** as well.

In this way, complex and/or large processes may be able to be comprehensively navigated. Additionally, the navigator component **602** may provide a small snapshot of an overall process, and may provide a view of the entire process within the current window. Further, the entire process may be viewed without zooming out, which may enable a user to navigate the process quickly. Further still, if a user is at or near the top of a large process, they may quickly and simply navigate to the bottom of the process using the navigator component **602**.

Zoom Component

Additionally, a zoom slider **608** is also located in the interface **600**. For example, the zoom slider **608** may be located in the top left of the main diagram **604**. Further, in one embodiment, the zoom slider **608** may be defaulted to 100% zoomed in. In another embodiment, adjusting the zoom slider **608** to 0% zoom may be equivalent to seeing the entire diagram in the default window size. Further still, in one embodiment, adjusting the zoom slider **608** may be equivalent to adjusting the size of the frame **606** in the navigator component **602**.

In another embodiment, the navigator component **602** may adjust to the location of the user. For example, the frame **606** of the navigator component **602** may move according to user movements in the main diagram **604**. Additionally, the navigator component **602** may consider borders, and may maintain a focus on a center of the diagram to scale when zooming in and out.

In addition, the interface **600** may include a legend **610**. In yet another embodiment, zooming may not affect the legend **610**. For example, the legend **610** may always stay the same size. In another embodiment, a user may use keyboard shortcuts to zoom in the interface **600**.

Search

FIG. **7** shows an exemplary searchable process diagram interface **700**, in accordance with one embodiment. As an option, the searchable process diagram interface **700** may be implemented in the context of the functionality of FIGS. **1-6**. Of course, however, the searchable process diagram interface **700** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description.

As shown, the searchable process diagram interface **700** includes a search component **702**. In one embodiment, the search component **702** may exist in the header to the left of a Help link **704**. Of course, however, the search component **702** may exist anywhere within the ° searchable process diagram **700**. Additionally, when the search component **702** is in focus a menu **706** appears. In one embodiment, the menu **706** may enable a user to filter their search. In one embodiment, if a user chooses any of the other options in the menu **706** besides the "All" option **708** than the "All" checkbox **708** may automatically uncheck. Additionally, if a user checks the "All" checkbox **708** then all the other options in the menu **706** may be unchecked.

Further, if a user checks the "Approval Steps" option **710** then the diagram interface **700** may gray out except for the steps. Additionally, once a user starts typing in the search bar **712**, nodes in the diagram interface **700** that do not match the search term would continue to gray out. Further, in one embodiment, when the term in the search bar **712** loses focus, the menu **706** may disappear. In still another embodiment, when a user starts typing text in the search bar **712**, all elements within the diagram interface **700** that contain the text may be highlighted.

FIG. **8** shows another exemplary searchable process diagram interface **800**, in accordance with one embodiment. As an option, the searchable process diagram interface **800** may be implemented in the context of the functionality of FIGS. **1-7**. Of course, however, the searchable process diagram interface **800** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description.

As shown, when a user starts typing in the search bar **802**, a mask appears over the diagram interface **800**, and nodes **804**, **806** that include the search term are highlighted. For example, the mask may be colored grey, whereas the nodes that include the search term may be highlighted in white. In one embodiment, only the nodes that include the search term (here, highlighted nodes **804** and **806**) may be interactive. For example, hovering over a masked node may not do anything. In another embodiment, the mask may appear as soon as the first character of the search term is entered, and as progressive characters of the search term are entered, the mask may grow larger as it covers nodes that do not meet those newly entered characters.

Also, a number of matches **808** may be displayed in the diagram interface **800**. For example, the number of matches **808** may be displayed to the left of the search box **810**. In another embodiment, if there are no matches, the area where the number of matches **808** is displayed may read "Not found." In yet another embodiment, clearing the search box **802** (e.g., by manually deleting the search term, or clicking the X button **812**) may exit search mode.

In another embodiment, the navigator window **814** may also be masked, with highlighted nodes that include the search term. In this way, a user may quickly identify and go to search matches within the navigator window **814**.

FIG. **9** shows yet another exemplary searchable process diagram interface **900**, in accordance with one embodiment. As an option, the searchable process diagram interface **900** may be implemented in the context of the functionality of FIGS. **1-8**. Of course, however, the searchable process diagram interface **900** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description. As shown, when a user hovers over a highlighted node **902** or **904**, the sidebar **910** appears, and the term searched for in the search bar **906** is highlighted **908** in the sidebar **910**. In this way, when performing a search, matching sidebar terms are highlighted during hovering over a node.

FIG. **10** shows still another exemplary searchable process diagram interface **1000**, in accordance with one embodiment. As an option, the searchable process diagram interface **1000** may be implemented in the context of the functionality of FIGS. **1-9**. Of course, however, the searchable process diagram interface **1000** may be carried out in any desired environment. Further, the aforementioned definitions may apply during the present description. As shown, when a user opens a subprocess **1002**, only the child node **1004** that contains the search term will be highlighted.

Additionally, diagram interface **1000** includes a Next button **1006** and a Previous button **1008**. In one embodiment, these buttons may appear next to the search bar. Of course, however, these buttons may be located anywhere on the diagram interface **1000**. In one embodiment, the next node containing a search result after a currently selected node may be selected by the Next button **1006**. For example, clicking the Next button **1006** may be equivalent to hovering over a next node that contains a search result. If the node is a child node (e.g., child node **1004**, etc.) in a subprocess, the subprocess may automatically be opened and the child node may be highlighted. Additionally, in one embodiment, if the next node is outside of the subprocess, the subprocess may automatically close.

Further, in another embodiment, if the next node is not visible in the window, than the window may automatically scroll so that the next node is visible. In yet another embodiment, if the user hovers over a node before clicking the "Next" button **1006**, once they click the "Next" button **1006** the node after the one that the user hovered on may be highlighted. For example, if a process is a four step process, and a user checks "Approval Steps" in a search component, then the match area **1010** may say "4 Matches," and a user may go through each of the four steps by using the Next button **1006** and the Previous button **1008** as well.

Window Size

In one embodiment, the process diagram may have a default window size. For example, the process diagram may have a default window width of 840 pixels and a default height of 450 pixels.

Zoom Controls

In one embodiment, "Zoom-In" and "Zoom-Out" buttons may be provided in the process diagram (e.g., in the footer of the process diagram, etc.). Additionally, in one embodiment, when a user zooms out, text may get smaller and there may be a limit to how far the user can zoom out. Further, when a user zooms in past a default state, the text may stay the same size and any ellipses may gradually drop out as the node becomes larger.

In this way, the process diagram may be centered as much as possible after zooming in or out. Additionally, after zooming in, the process diagram may be centered when a user subsequently zooms back out. In this way, the process diagram may be centrally structured, centrally aligned, etc.

Alternate Layouts

In one embodiment, the sidebar of the process diagram may include multiple panels. For example, the sidebar may include a Process Properties panel, a Workflow Actions panel, an Inspector panel, etc. In another embodiment, the option to hover over one or more elements of the process diagram may be removed. Additionally, in another embodiment, a user may select an action or a node of the process diagram by clicking on one or the other. For example, selecting an action may deselect a node, selecting a node may deselect an action, etc.

Further, in one embodiment, when a user selects an action of the process diagram, action details may be displayed in the Inspector panel. Additionally, nodes in the process diagram where the action exists may be outlined. Further, for opened subprocesses, only the child node may be outlined (e.g., the parent node may not be outlined). In another embodiment, when the user selects a node, node details may be shown in the Inspector panel. Additionally, the node may have a selection style (which may override a dirty style if the node is dirty). Further, if the selected node is a step, an edit button may be shown, and if the node is an action, a remove button may be shown.

Also, in another embodiment, upon performing a drag and drop, a selected action may remain selected, and its details may remain in the Inspector panel. Upon performing a drop, the selected node may be come dirty and may be outlined. In yet another embodiment, an Action list may exist in the sidebar or elsewhere in the process diagram, and if a user double clicks on an action in an Action list, an overlay may be shown with one or more details of the action. In another embodiment, this overlay may be editable. One exemplary action being selected in a sidebar of a process diagram interface is shown in FIG. **11**, in accordance with one embodiment. Additionally, an exemplary subprocess being selected in a sidebar of a process diagram interface is shown in FIG. **12**, in accordance with one embodiment. Further, an exemplary action being double-clicked in a sidebar or a diagram in a process diagram interface is shown in FIG. **13**, in accordance with one embodiment. Further still, an exemplary drag and drop action in a process diagram interface is shown in FIGS. **14**A and **14**B, in accordance with one embodiment.

Find Functionality

In one embodiment, a find mode may be enabled for the process diagram. In one embodiment, when a user selects a find mode, a Workflow Actions pane may be disabled. In another embodiment, the find mode may operated similarly to searching, including the ability to cycle through matches, etc. In another embodiment, if a next match is found in a Process Properties pane of the process diagram and the Process Properties pane is closed, such pane may be opened. Further, in another embodiment, highlighted nodes may be selected (e.g., clicked on, etc.) to see one or more details of the nodes. In another embodiment, a sidebar of the process diagram may not be masked, and hits within the sidebar may be highlighted in yellow. Exemplary find functionality of a process diagram interface is shown in FIG. **15**, in accordance with one embodiment.

Add Step

In one embodiment, functionality for adding a step to the process diagram may be included in the process diagram. For example, an "Add Step" button may be added to a button bar of the process diagram. Additionally, in one embodiment, selecting the "Add Step" button may open an overlay. For example, selecting the "Add Step" button may open an overlay that is the same as an "Edit Step" overlay but with blank fields. Exemplary functionality for adding a step in a process diagram interface is shown in the exemplary process diagram interface **1600** of FIG. **16**, in accordance with one embodiment. As shown, the process diagram interface **1600** includes an add step button **1602**. In one embodiment, the add step button **1602** may be shown in certain circumstances, and greyed out in other circumstances. For example, the add step button **1602** may be greyed out when a process status is active. In another example, the add step button **1602** may be greyed out when a process is deactivated but was previously activated. This may be irrespective of the fact that there may be no records which refer to the process.

Additionally, an exemplary overlay for adding a step in a process diagram interface is shown in FIG. **17**, in accordance with one embodiment. In one embodiment, a user may only reorder a new step of the process diagram. For example, other steps of the process diagram may not be selectable. Further, in one embodiment, a new step may be placed at the end of the process diagram (e.g., as a default, etc.). Further still, a user may reorder the new step by using one or more buttons (e.g., up and down buttons, etc.). In another embodiment, the user may reorder the new step by dragging it up and down in the process diagram window.

Hover Buttons

In one embodiment, different elements of the process diagram may react differently when a user hovers over them (e.g., using a mouse pointer, etc.). For example, upon hovering on a step, options may appear to edit or remove the step. For example, a delete option may appear that, when selected, opens a prompt that says "Are you sure you want to remove this step?" Additionally, an edit option may appear that, when selected, opens an edit overlay. In another embodiment, the edit overlay may appear when a user double-clicks on a node. Exemplary hover options existing for a node in a process diagram interface are shown in FIG. **18**A, in accordance with one embodiment.

In another example, upon hovering on an action group, an option may appear to remove the action group. For example, a delete option may appear that, when selected, opens a

prompt that says "Are you sure you want to remove all 2 actions in this group?" Exemplary hover options existing for an action group in a process diagram interface is shown in FIG. **18**B, in accordance with one embodiment.

In yet another example, upon hovering on an action, an option may appear to remove the action group or open an overlay. For example, a delete option may appear that, when selected, deletes the action. Additionally, an overlay option may appear that, when selected, opens an action overlay for the action. In another embodiment, the action overlay may appear when a user double-clicks on the action. Exemplary hover options existing for an action in a process diagram interface are shown in FIG. **18**C, in accordance with one embodiment.

Approver Settings

In one embodiment, one or more approver settings may exist for the process diagram. Additionally, these approver settings may be the same for both Add and Edit steps. In one embodiment, options to select an approver may exist as one or more radio buttons, a picklist, etc. In yet another embodiment, a default option may exist for assigning an approver. For example, a default menu selection option may include "Automatically assign to <DYNAMIC>," where the dynamic text may come from process properties, in a screenshot below its Manager. In one embodiment, the default option may show the label, and not the developer name. In another embodiment, if the process properties do not have a manager field specified, the default option may not be provided to the user.

Additionally, the above default option may be used if the process properties have the manager field specified. Otherwise, the default may be "Let the submitter chose the approver manually." Further, in one embodiment, queues may be supported. For example, if a process has a step assigned to a queue, the user may not be able to change the queue name but may be able to change the overall option. For instance, the user may be above to change the name from the queue to say "manual." In another embodiment, a name of the queue may dynamically appear on the picklist. An exemplary approver settings overlay in a process diagram interface is shown in FIG. **19**, in accordance with one embodiment. Additionally, one exemplary approver settings overlay picklist in a process diagram interface is shown in FIG. **20**, in accordance with one embodiment.

In another embodiment, when a user selects a "Manually select approver(s)" option on the picklist, a pane may be shown with approver settings. Additionally, the picklist may include information related to a user and related user (e.g., a user option, a related user option, etc.). Further, if a user option is selected, an autocomplete component may be shown (e.g., instead of a lookup). Further still, if a related user option is selected, another picklist may be shown with related user values. Also, an add button may be disabled until a user enters a valid user option.

In yet another embodiment, when a user types a certain number of characters, results may start to be fetched. For example, the number of characters may be one, or may be more than one in order to improve performance. Additionally, a loading message may be shown while fetching results. Further, every time a user enters another character, a new query may be initiated. In this way, results may always be accurate. Further still, search results may be based on a first character of each new word (e.g., where the word is either a first name, a last name, a role, etc.). Also, if no results are found, an alert may be made to the user indicating that no results were found.

In still another embodiment, when results exist, a grid may be shown with two columns. For example, the columns may include a full name column and role column. Additionally, the grid may be scrollable and may show a default number of records (e.g., 15-20 records), where the default may be adjusted in order to optimize the display of records. Further, there may be a cap on how many results are displayed in order to improve performance. Further still, a persistent message may exist that informs the user that a set number of records is being returned, and that a user needs to type more characters to narrow search results. Also, upon clicking on a row, the grid may be closed and a textbox may be populated with the selected entry. Further, all matches may be shown in bold.

In addition, in another embodiment, when a user clicks on an add button, the textbox may be cleared and the information to be added may be added to the box below. Further, a user may be able to add approvers by hitting a key on a keyboard (e.g., the Enter key, etc.). This may add the approver and keep the focus on the current textbox. Further still, a remove link may exist for every approver.

Also, in another embodiment, when the user selects the related user option, a picklist may be shown which contains user lookups related to the object. Additionally, when a user adds a related user, the picklist may be reverted to a null state. Further, when there are multiple approvers, multiple approver settings may be shown. In yet another embodiment, a user may be notified when they have added a maximum number of approvers.

Edit Properties

In another embodiment, an edit button may exist in the "Process Properties" portion of the sidebar. Selecting this edit button may open an overlay to perform one more edits to the process diagram. One exemplary edit button placement in a process diagram interface is shown in FIG. **21**, in accordance with one embodiment. Additionally, one exemplary edit overlay in a process diagram interface is shown in FIG. **22**, in accordance with one embodiment.

System Overview

FIG. **23** illustrates a block diagram of an environment **2310** wherein a process diagram might be used. As an option, any of the previously described embodiments of the foregoing figures may or may not be implemented in the context of the environment **2310**. Environment **2310** may include user systems **2312**, network **2314**, system **2316**, processor system **2317**, application platform **2318**, network interface **2320**, tenant data storage **2322**, system data storage **2324**, program code **2326**, and process space **2328**. In other embodiments, environment **2310** may not have all of the components listed and/or may have other elements instead of, or in addition to, those listed above.

Environment **2310** is an environment in which an process diagram is implemented. User system **2312** may be any machine or system that is used by a user to access a database user system. For example, any of user systems **2312** can be a handheld computing device, a mobile phone, a laptop computer, a work station, and/or a network of computing devices. As illustrated in FIG. **23** (and in more detail in FIG. **24**) user systems **2312** might interact via a network with an on-demand database service, which is system **2316**.

An on-demand database service, such as system **2316**, is a database system that is made available to outside users that do not need to necessarily be concerned with building and/or maintaining the database system, but instead may be available for their use when the users need the database system (e.g., on the demand of the users). Some on-demand database services may store information from one or more tenants stored into tables of a common database image to form a multi-tenant database system (MTS). Accordingly, "on-demand database service **2316**" and "system **2316**" will be used interchange-

ably herein. A database image may include one or more database objects. A relational database management system (RDMS) or the equivalent may execute storage and retrieval of information against the database object(s). Application platform **2318** may be a framework that allows the applications of system **2316** to run, such as the hardware and/or software, e.g., the operating system. In an embodiment, on-demand database service **416** may include an application platform **2318** that enables creation, managing and executing one or more applications developed by the provider of the on-demand database service, users accessing the on-demand database service via user systems **2312**, or third party application developers accessing the on-demand database service via user systems **2312**.

The users of user systems **2312** may differ in their respective capacities, and the capacity of a particular user system **2312** might be entirely determined by permissions (permission levels) for the current user. For example, where a salesperson is using a particular user system **2312** to interact with system **2316**, that user system has the capacities allotted to that salesperson. However, while an administrator is using that user system to interact with system **2316**, that user system has the capacities allotted to that administrator. In systems with a hierarchical role model, users at one permission level may have access to applications, data, and database information accessible by a lower permission level user, but may not have access to certain applications, database information, and data accessible by a user at a higher permission level. Thus, different users will have different capabilities with regard to accessing and modifying application and database information, depending on a user's security or permission level.

Network **2314** is any network or combination of networks of devices that communicate with one another. For example, network **2314** can be any one or any combination of a LAN (local area network), WAN (wide area network), telephone network, wireless network, point-to-point network, star network, token ring network, hub network, or other appropriate configuration. As the most common type of computer network in current use is a TCP/IP (Transfer Control Protocol and Internet Protocol) network, such as the global internetwork of networks often referred to as the "Internet" with a capital "I," that network will be used in many of the examples herein. However, it should be understood that the networks that the present invention might use are not so limited, although TCP/IP is a frequently implemented protocol.

User systems **2312** might communicate with system **2316** using TCP/IP and, at a higher network level, use other common Internet protocols to communicate, such as HTTP, FTP, AFS, WAP, etc. In an example where HTTP is used, user system **412** might include an HTTP client commonly referred to as a "browser" for sending and receiving HTTP messages to and from an HTTP server at system **2316**. Such an HTTP server might be implemented as the sole network interface between system **2316** and network **2314**, but other techniques might be used as well or instead. In some implementations, the interface between system **2316** and network **2314** includes load sharing functionality, such as round-robin HTTP request distributors to balance loads and distribute incoming HTTP requests evenly over a plurality of servers. At least as for the users that are accessing that server, each of the plurality of servers has access to the MTS' data; however, other alternative configurations may be used instead.

In one embodiment, system **2316**, shown in FIG. **23**, implements a web-based customer relationship management (CRM) system. For example, in one embodiment, system **2316** includes application servers configured to implement and execute CRM software applications as well as provide related data, code, forms, webpages and other information to and from user systems **2312** and to store to, and retrieve from, a database system related data, objects, and Webpage content. With a multi-tenant system, data for multiple tenants may be stored in the same physical database object, however, tenant data typically is arranged so that data of one tenant is kept logically separate from that of other tenants so that one tenant does not have access to another tenant's data, unless such data is expressly shared. In certain embodiments, system **2316** implements applications other than, or in addition to, a CRM application. For example, system **2316** may provide tenant access to multiple hosted (standard and custom) applications, including a CRM application. User (or third party developer) applications, which may or may not include CRM, may be supported by the application platform **2318**, which manages creation, storage of the applications into one or more database objects and executing of the applications in a virtual machine in the process space of the system **2316**.

One arrangement for elements of system **2316** is shown in FIG. **24**, including a network interface **2320**, application platform **2318**, tenant data storage **2322** for tenant data **2323**, system data storage **2324** for system data accessible to system **2316** and possibly multiple tenants, program code **2326** for implementing various functions of system **2316**, and a process space **2328** for executing MTS system processes and tenant-specific processes, such as running applications as part of an application hosting service. Additional processes that may execute on system **2316** include database indexing processes.

Several elements in the system shown in FIG. **23** include conventional, well-known elements that are explained only briefly here. For example, each user system **2312** could include a desktop personal computer, workstation, laptop, PDA, cell phone, or any wireless access protocol (WAP) enabled device or any other computing device capable of interfacing directly or indirectly to the Internet or other network connection. User system **2312** typically runs an HTTP client, e.g., a browsing program, such as Microsoft's Internet Explorer browser, Netscape's Navigator browser, Opera's browser, or a WAP-enabled browser in the case of a cell phone, PDA or other wireless device, or the like, allowing a user (e.g. subscriber of the multi-tenant database system) of user system **2312** to access, process and view information, pages and applications available to it from system **2316** over network **2314**. Each user system **2312** also typically includes one or more user interface devices, such as a keyboard, a mouse, trackball, touch pad, touch screen, pen or the like, for interacting with a graphical user interface (GUI) provided by the browser on a display (e.g. a monitor screen, LCD display, etc.) in conjunction with pages, forms, applications and other information provided by system **2316** or other systems or servers. For example, the user interface device can be used to access data and applications hosted by system **2316**, and to perform searches on stored data, and otherwise allow a user to interact with various GUI pages that may be presented to a user. As discussed above, embodiments are suitable for use with the Internet, which refers to a specific global internetwork of networks. However, it should be understood that other networks can be used instead of the Internet, such as an intranet, an extranet, a virtual private network (VPN), a non-TCP/IP based network, any LAN or WAN or the like.

According to one embodiment, each user system **2312** and all of its components are operator configurable using applications, such as a browser, including computer code run using a central processing unit such as an Intel Pentium® processor or the like. Similarly, system **2316** (and additional instances of an MTS, where more than one is present) and all of their

components might be operator configurable using application (s) including computer code to run using a central processing unit such as processor system **2317** of FIG. **23**, which may include an Intel Pentium® processor or the like, and/or multiple processor units. A computer program product embodiment includes a machine-readable storage medium (media) having instructions stored thereon/in which can be used to program a computer to perform any of the processes of the embodiments described herein. Computer code for operating and configuring system **2316** to intercommunicate and to process webpages, applications and other data and media content as described herein are preferably downloaded and stored on a hard disk, but the entire program code, or portions thereof, may also be stored in any other volatile or non-volatile memory medium or device as is well known, such as a ROM or RAM, or provided on any media capable of storing program code, such as any type of rotating media including floppy disks, optical discs, digital versatile disk (DVD), compact disk (CD), microdrive, and magneto-optical disks, and magnetic or optical cards, nanosystems (including molecular memory ICs), or any type of media or device suitable for storing instructions and/or data. Additionally, the entire program code, or portions thereof, may be transmitted and downloaded from a software source over a transmission medium, e.g., over the Internet, or from another server, as is well known, or transmitted over any other conventional network connection as is well known (e.g. extranet, VPN, LAN, etc.) using any communication medium and protocols (e.g. TCP/IP, HTTP, HTTPS, Ethernet, etc.) as are well known. It will also be appreciated that computer code for implementing embodiments of the present invention can be implemented in any programming language that can be executed on a client system and/or server or server system such as, for example, C, C++, HTML, any other markup language, Java™, JavaScript, ActiveX, any other scripting language, such as VBScript, and many other programming languages as are well known may be used. (Java™ is a trademark of Sun Microsystems, Inc.).

According to one embodiment, each system **2316** is configured to provide webpages, forms, applications, data and media content to user (client) systems **2312** to support the access by user systems **2312** as tenants of system **2316**. As such, system **2316** provides security mechanisms to keep each tenant's data separate unless the data is shared. If more than one MTS is used, they may be located in close proximity to one another (e.g. in a server farm located in a single building or campus), or they may be distributed at locations remote from one another (e.g. one or more servers located in city A and one or more servers located in city B). As used herein, each MTS could include one or more logically and/or physically connected servers distributed locally or across one or more geographic locations. Additionally, the term "server" is meant to include a computer system, including processing hardware and process space(s), and an associated storage system and database application (e.g. OODBMS or RDBMS) as is well known in the art. It should also be understood that "server system" and "server" are often used interchangeably herein. Similarly, the database object described herein can be implemented as single databases, a distributed database, a collection of distributed databases, a database with redundant online or offline backups or other redundancies, etc., and might include a distributed database or storage network and associated processing intelligence.

FIG. **24** also illustrates environment **2310**. However, in FIG. **5**A-FIG. **5**E elements of system **2316** and various interconnections in an embodiment are further illustrated. FIG. **5**A-FIG. **5**E shows that user system **2312** may include processor system **2312**A, memory system **2312**B, input system **2312**C, and output system **2312**D. FIG. **5**A-FIG. **5**E shows network **2314** and system **2316**. FIG. **5**A-FIG. **5**E also shows that system **2316** may include tenant data storage **2322**, tenant data **2323**, system data storage **2324**, system data **2325**, User Interface (UI) **2430**, Application Program Interface (API) **2432**, PL/SOQL **2434**, save routines **2436**, application setup mechanism **2438**, applications servers $\mathbf{2400}_1$-$\mathbf{2400}_N$, system process space **2402**, tenant process spaces **2404**, tenant management process space **2410**, tenant storage area **2412**, user storage **2414**, and application metadata **2416**. In other embodiments, environment **2310** may not have the same elements as those listed above and/or may have other elements instead of, or in addition to, those listed above.

User system **2312**, network **2314**, system **2316**, tenant data storage **2322**, and system data storage **2324** were discussed above in FIG. **23**. Regarding user system **2312**, processor system **2312**A may be any combination of one or more processors. Memory system **2312**B may be any combination of one or more memory devices, short term, and/or long term memory. Input system **2312**C may be any combination of input devices, such as one or more keyboards, mice, trackballs, scanners, cameras, and/or interfaces to networks. Output system **2312**D may be any combination of output devices, such as one or more monitors, printers, and/or interfaces to networks. As shown by FIG. **24**, system **2316** may include a network interface **2320** (of FIG. **23**) implemented as a set of HTTP application servers **2400**, an application platform **2318**, tenant data storage **2322**, and system data storage **2324**. Also shown is system process space **2402**, including individual tenant process spaces **2404** and a tenant management process space **2410**. Each application server **2400** may be configured to tenant data storage **2322** and the tenant data **2323** therein, and system data storage **2324** and the system data **2325** therein to serve requests of user systems **2312**. The tenant data **2323** might be divided into individual tenant storage areas **2412**, which can be either a physical arrangement and/or a logical arrangement of data. Within each tenant storage area **2412**, user storage **2414** and application metadata **2416** might be similarly allocated for each user. For example, a copy of a user's most recently used (MRU) items might be stored to user storage **2414**. Similarly, a copy of MRU items for an entire organization that is a tenant might be stored to tenant storage area **2412**. A UI **2430** provides a user interface and an API **2432** provides an application programmer interface to system **2316** resident processes to users and/or developers at user systems **2312**. The tenant data and the system data may be stored in various databases, such as one or more Oracle™ databases.

Application platform **2318** includes an application setup mechanism **2438** that supports application developers' creation and management of applications, which may be saved as metadata into tenant data storage **2322** by save routines **2436** for execution by subscribers as one or more tenant process spaces **2404** managed by tenant management process **2410** for example. Invocations to such applications may be coded using PL/SOQL **2434** that provides a programming language style interface extension to API **2432**. A detailed description of some PL/SOQL language embodiments is discussed in commonly owned U.S. Provisional Patent Application 60/828,192 entitled, "PROGRAMMING LANGUAGE METHOD AND SYSTEM FOR EXTENDING APIS TO EXECUTE IN CONJUNCTION WITH DATABASE APIS," by Craig Weissman, filed Oct. 4, 2006, which is incorporated in its entirety herein for all purposes. Invocations to applications may be detected by one or more system processes, which manage retrieving application metadata **2416** for the

subscriber making the invocation and executing the metadata as an application in a virtual machine.

Each application server **2400** may be communicably coupled to database systems, e.g., having access to system data **2325** and tenant data **2323**, via a different network connection. For example, one application server **2400**$_1$ might be coupled via the network **2314** (e.g., the Internet), another application server **2400**$_{N-1}$ might be coupled via a direct network link, and another application server **2400**$_N$ might be coupled by yet a different network connection. Transfer Control Protocol and Internet Protocol (TCP/IP) are typical protocols for communicating between application servers **2400** and the database system. However, it will be apparent to one skilled in the art that other transport protocols may be used to optimize the system depending on the network interconnect used.

In certain embodiments, each application server **2400** is configured to handle requests for any user associated with any organization that is a tenant. Because it is desirable to be able to add and remove application servers from the server pool at any time for any reason, there is preferably no server affinity for a user and/or organization to a specific application server **2400**. In one embodiment, therefore, an interface system implementing a load balancing function (e.g., an F5 Big-IP load balancer) is communicably coupled between the application servers **2400** and the user systems **2312** to distribute requests to the application servers **2400**. In one embodiment, the load balancer uses a least connections algorithm to route user requests to the application servers **2400**. Other examples of load balancing algorithms, such as round robin and observed response time, also can be used. For example, in certain embodiments, three consecutive requests from the same user could hit three different application servers **2400**, and three requests from different users could hit the same application server **2400**. In this manner, system **2316** is multi-tenant, wherein system **2316** handles storage of, and access to, different objects, data and applications across disparate users and organizations.

As an example of storage, one tenant might be a company that employs a sales force where each salesperson uses system **2316** to manage their sales process. Thus, a user might maintain contact data, leads data, customer follow-up data, performance data, goals and progress data, etc., all applicable to that user's personal sales process (e.g., in tenant data storage **2322**). In an example of a MTS arrangement, since all of the data and the applications to access, view, modify, report, transmit, calculate, etc., can be maintained and accessed by a user system having nothing more than network access, the user can manage his or her sales efforts and cycles from any of many different user systems. For example, if a salesperson is visiting a customer and the customer has Internet access in their lobby, the salesperson can obtain critical updates as to that customer while waiting for the customer to arrive in the lobby.

While each user's data might be separate from other users' data regardless of the employers of each user, some data might be organization-wide data shared or accessible by a plurality of users or all of the users for a given organization that is a tenant. Thus, there might be some data structures managed by system **2316** that are allocated at the tenant level while other data structures might be managed at the user level. Because an MTS might support multiple tenants including possible competitors, the MTS should have security protocols that keep data, applications, and application use separate. Also, because many tenants may opt for access to an MTS rather than maintain their own system, redundancy, up-time, and backup are additional functions that may be implemented in the MTS. In addition to user-specific data and tenant-specific data, system **2316** might also maintain system level data usable by multiple tenants or other data. Such system level data might include industry reports, news, postings, and the like that are sharable among tenants.

In certain embodiments, user systems **2312** (which may be client systems) communicate with application servers **2400** to request and update system-level and tenant-level data from system **2316** that may require sending one or more queries to tenant data storage **2322** and/or system data storage **2324**. System **2316** (e.g., an application server **2400** in system **2316**) automatically generates one or more SQL statements (e.g., one or more SQL queries) that are designed to access the desired information. System data storage **2324** may generate query plans to access the requested data from the database.

Each database can generally be viewed as a collection of objects, such as a set of logical tables, containing data fitted into predefined categories. A "table" is one representation of a data object, and may be used herein to simplify the conceptual description of objects and custom objects according to the present invention. It should be understood that "table" and "object" may be used interchangeably herein. Each table generally contains one or more data categories logically arranged as columns or fields in a viewable schema. Each row or record of a table contains an instance of data for each category defined by the fields. For example, a CRM database may include a table that describes a customer with fields for basic contact information such as name, address, phone number, fax number, etc. Another table might describe a purchase order, including fields for information such as customer, product, sale price, date, etc. In some multi-tenant database systems, standard entity tables might be provided for use by all tenants. For CRM database applications, such standard entities might include tables for Account, Contact, Lead, and Opportunity data, each containing pre-defined fields. It should be understood that the word "entity" may also be used interchangeably herein with "object" and "table".

In some multi-tenant database systems, tenants may be allowed to create and store custom objects, or they may be allowed to customize standard entities or objects, for example by creating custom fields for standard objects, including custom index fields. U.S. patent application Ser. No. 10/817,161, filed Apr. 2, 2004, entitled "CUSTOM ENTITIES AND FIELDS IN A MULTI-TENANT DATABASE SYSTEM," which is hereby incorporated herein by reference, teaches systems and methods for creating custom objects as well as customizing standard objects in a multi-tenant database system. In certain embodiments, for example, all custom entity data rows are stored in a single multi-tenant physical table, which may contain multiple logical tables per organization. It is transparent to customers that their multiple "tables" are in fact stored in one large table or that their data may be stored in the same table as the data of other customers.

It should be noted that any of the different embodiments described herein may or may not be equipped with any one or more of the features set forth in one or more of the following published applications: US2003/0233404, titled "OFFLINE SIMULATION OF ONLINE SESSION BETWEEN CLIENT AND SERVER," filed Nov. 4, 2002; US2004/0210909, titled "JAVA OBJECT CACHE SERVER FOR DATABASES," filed Apr. 17, 2003, now issued U.S. Pat. No. 7,209,929; US2005/0065925, titled "QUERY OPTIMIZATION IN A MULTI-TENANT DATABASE SYSTEM," filed Sep. 23, 2003; US2005/0223022, titled "CUSTOM ENTITIES AND FIELDS IN A MULTI-TENANT DATABASE SYSTEM," filed Apr. 2, 2004; US2005/0283478, titled "SOAP-BASED WEB SERVICES IN A MULTI-TENANT DATABASE

SYSTEM," filed Jun. 16, 2004; US2006/0206834, titled "SYSTEMS AND METHODS FOR IMPLEMENTING MULTI-APPLICATION TABS AND TAB SETS," filed Mar. 8, 2005; and/or US2008/0010243, titled "METHOD AND SYSTEM FOR PUSHING DATA TO A PLURALITY OF DEVICES IN AN ON-DEMAND SERVICE ENVIRONMENT," filed Jun. 1, 2007; which are each incorporated herein by reference in their entirety for all purposes.

While the invention has been described by way of example and in terms of the specific embodiments, it is to be understood that the invention is not limited to the disclosed embodiments. To the contrary, it is intended to cover various modifications and similar arrangements as would be apparent to those skilled in the art. Therefore, the scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.

The invention claimed is:

1. A method, comprising:

incorporating, by a system, one or more steps into a process diagram to be displayed to a user, where the one or more steps include:

data dynamically retrieved from data storage accessible by a plurality of users, the data to be displayed to the user within the one or more steps for viewing by the user, and

an update to one or more fields of data to be displayed to the user, where the update includes data shared by the plurality of users and used by a plurality of applications of the system; and

incorporating one or more states into the process diagram by the system, where the one or more steps are associated with the one or more states.

2. The method of claim **1**, further comprising incorporating a sidebar into an interface associated with the process diagram.

3. The method of claim **2**, wherein the sidebar appears when the one of the one or more steps and one or more states of the process diagram are selected.

4. The method of claim **2**, wherein the sidebar is used to incorporate one or more additional elements into the process diagram.

5. The method of claim **4**, wherein one or more elements are selected from the sidebar and dragged onto the process diagram in order to incorporate them into the process diagram.

6. The method of claim **1**, further comprising incorporating a properties pane component into an interface associated with the process diagram.

7. The method of claim **6**, wherein the properties pane component appears when one or more elements of the process diagram are selected.

8. The method of claim **1**, further comprising incorporating a search component into an interface associated with the process diagram.

9. The method of claim **1**, wherein the update to the one or more fields of data includes one or more of a lookup value, a formula, a recipient, an assignee, a due date, and an endpoint.

10. The method of claim **1**, wherein the one or more steps include sending a message to one or more recipients.

11. A non-transitory machine-readable medium carrying one or more sequences of instructions which, when executed by one or more processors, are configured to cause a computer to implement the steps of:

incorporating, by a system, one or more steps into a process diagram to be displayed to a user, where the one or more steps include:

data dynamically retrieved from data storage accessible by a plurality of users, the data to be displayed to the user within the one or more steps for viewing by the user, and

an update to one or more fields of data to be displayed to the user, where the update includes data shared by the plurality of users and available for use by a plurality of applications of the system; and

incorporating one or more states into the process diagram by the system, where the one or more steps are associated with the one or more states.

12. An apparatus, comprising:

a processor; and

one or more stored sequences of instructions which, when executed by the processor, cause the processor to carry out the steps of:

incorporating, by a system, one or more steps into a process diagram to be displayed to a user, where the one or more steps include:

data dynamically retrieved from data storage accessible by a plurality of users, the data to be displayed to the user within the one or more steps for viewing by the user, and

an update to one or more fields of data to be displayed to the user, where the update includes data shared by the plurality of users and available for use by a plurality of applications of the system; and

incorporating one or more states into the process diagram by the system, where the one or more steps are associated with the one or more states.

* * * * *